



DATA EAST PINBALL ®

1990 Janice Avenue
Melrose Park, IL 60160
708-345-7700
FAX 708-345-7718
1-800-KICKERS

CPU JUMPER TABLE

Game	CPU* Version	ROM Location	Jumpers	
			Installed	Removed
Time Machine	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Playboy	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
ABC M.N. Football	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Robocop	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Phantom of the Opera	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Back to the Future	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
The Simpsons	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Checkpoint	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Teen. Mut. Ninja Turtles	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Batman	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Star Trek	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Hook	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Lethal Weapon 3	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Star Wars	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a
Rocky & Bullwinkle	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a

*Version 1 has a 2K RAM which is a 24-pin IC at location 5D.

*Version 2 has an 8K RAM which is a 28-pin IC at location 5D.

Power-up CPU Self Tests

Upon power-up, the CPU board performs a series of self tests of major components. Turn the game on while observing the LEDs on the CPU board. Tests of the PIAs, RAM, and EPROMs are performed automatically and results of the test are indicated by the PIA LED.

With all tests passed, the LEDs illuminate in the following sequence at power turn-on. The PIA and +5V LEDs illuminate immediately. Approximately 1/2-second later the PIA LED goes out and the Blanking LED illuminates; the +5V and Blanking LEDs remain illuminated until the game is turned off. Test failures are indicated with the PIA LED:

PIA LED

Stays On
Flashes 1 Time
Flashes 2 Times
Flashes 3 Times

SUSPECT COMPONENT

One of the 6821 PIAs
6064 RAM at location D5.
EPROM at location B5.
EPROM at location C5.

QUICK REFERENCE FUSE CHART

PPB BOARD

F1 5A Slo-Blo G.I. 6.3VAC
F2 5A Slo-Blo G.I. 6.3VAC
F3 5A Slo-Blo G.I. 6.3VAC
F4 5A Slo-Blo G.I. 6.3VAC
F5 5A Slo-Blo Flipper Power 48VAC
F6 5A Slo-Blo PPB Solenoids/Flash Lamps (34VDC)

POWER SUPPLY BOARD

F1 7A Slo-Blo +5VDC Regulator Input (9VAC)
F2 7A Slo-Blo +5VDC Regulator Input (9VAC)
F3 Not Used
F4 8A Slo-Blo Switched Illumination Buss (18VDC)
F5 5A Slo-Blo Solenoid Buss (34VDC)
F6 5A Slo-Blo Solenoid Buss (34VDC)
F7 0.5A Slo-Blo Display Reg. Input (90VAC)

Rocky & Bullwinkle & Friends

TABLE OF CONTENTS

GAME SPECIFICATIONS	1
Power Requirements.....	1
Major Assembly and Fuse Locations	1
Circuit Board PROM Locations	1
Transportation	1
ASSEMBLY PROCEDURES	1
GAME OPERATION	3
Standard Features.....	3
Manual Percentaging	3
Game Specific Features	4
AUDIT FUNCTIONS	7
General	7
'Quick Look' Functions	7
Expanded Functions.....	9
Game Specific Functions	10
GAME ADJUSTMENTS.....	13
General	13
Replay and Generic Features	13
Single-Function Difficulty Adjustments	15
Novelty/5-Ball/Add-A-Ball Rules	15
Game Pricing	16
Additional Generic Features.....	18
Game Specific Features	19
DIAGNOSTIC PROCEDURES	21
Entering Diagnostics	21
Service Credits	21
Tech Alert	21
Burn In Minutes	21
Sound Tests	22
Digital Display Tests.....	23
Switch Tests	24
Lamp Tests.....	26
Coil/Flash Lamp Tests.....	28
Return to Game Over	28
PARTS IDENTIFICATION	30
Cabinet Parts.....	30
Playfield - Major Assemblies	31
Playfield Rubbers	32
Backbox Parts	32
Playfield Top Parts	33
Lamp Bulb Part Numbers	34
UNIQUE PARTS	35
Vertical Up Kicker.....	35
Super Vertical Up Kicker	35
Flipper Assembly.....	36
Slingshot Assembly	37
Trough Eject Assembly	37
Outhole Ball Return Assembly	38
Turbo Bumper	38
Knocker \ Kickback Assembly	39
Ball Launch Assembly	39
Ramp Ball Diverter	40
Playfield Ball Diverter	41

Continued on next page

Nell Log Assembly	66
Insert Assembly	67
Under-Chute Ramp.....	68
Ball Return Ramp	69
WABAC Ramp	70
Ramp Entrance Assembly	71
Clock Assembly	72
Drop Target Assembly	73
SERVICING DIAGRAMS	42
Cabinet Wiring Diagram	42
Combined Display Connections	43
Power Wiring Diagram	44
Backbox Wiring Diagram	45
Playfield Coil/Flash Lamp Wiring Diagram	46
Playfield Special Coil Diagram	47
Playfield Switch Wiring Diagram	48
Playfield Lamp Wiring Diagram	49
CPU Board	50
Power Supply Board	55
Digital Stereo Sound Board	56
Display Board	58
PPB Board	63
Solid State Flipper	64

GAME SPECIFICATIONS

POWER REQUIREMENTS

This game is provided with a 3-prong plug and **must be connected to a properly grounded outlet to reduce shock hazard** and insure proper game operation. Refer to AC Power Wiring Diagram for transformer connections required for normal, high, and low line conditions.

Normal Line: 109 to 129 Vac (211 to 225 Vac)

High Line: (226 to 235 Vac)

Low Line: 95 to 108 Vac (200 to 210 Vac)

MAJOR ASSEMBLY AND FUSE LOCATIONS

Refer to the Game Illustration (page 2) to identify locations of the major assemblies, and fuse values and locations.

PROM SUMMARY

CPU Board: Location 5C

Sound Board: Locations U17 (Voice ROM 1), U21 (Voice ROM 2), and U7 (Sound ROM)

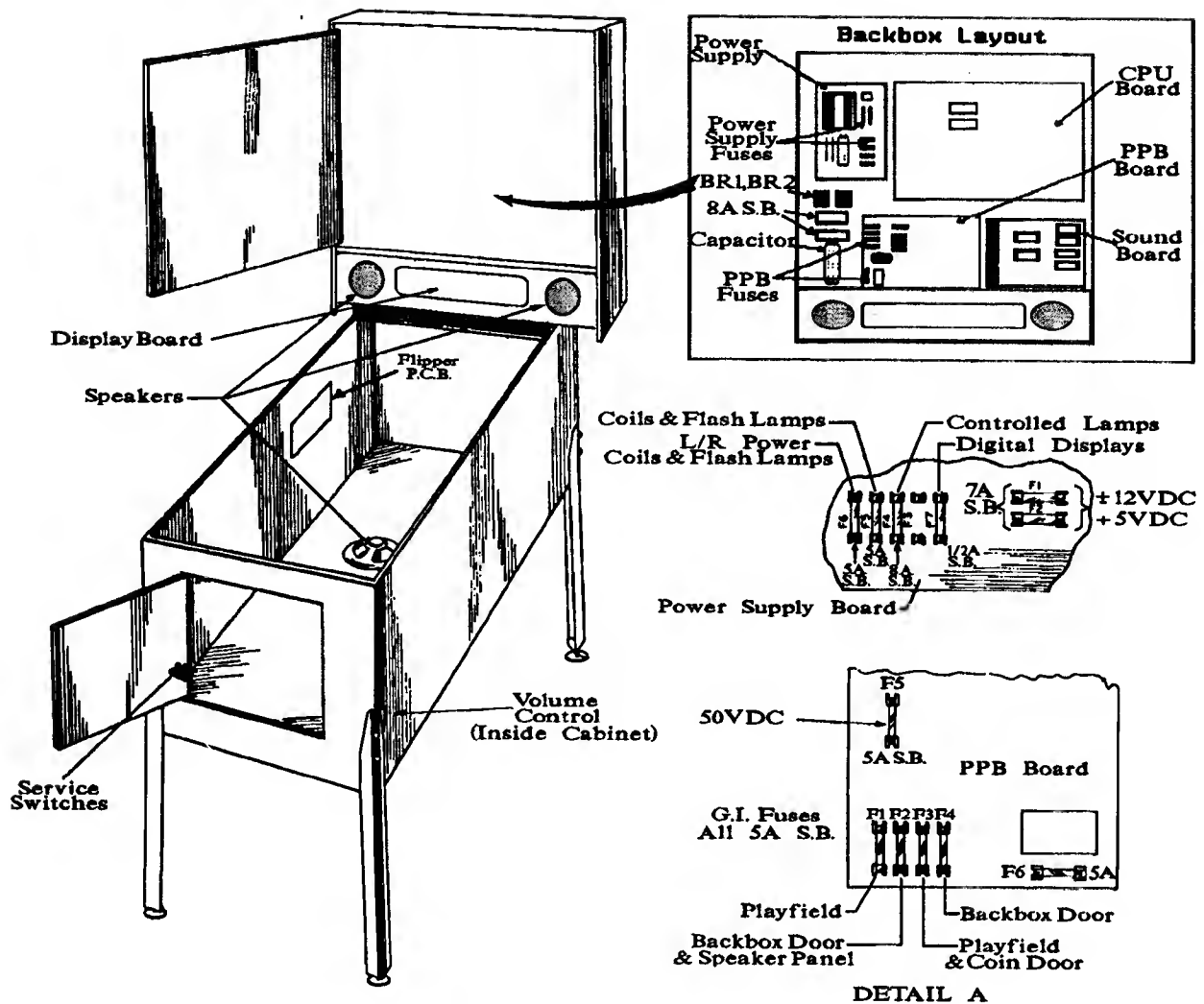
Display Controller Board: Locations U12 & U14

TRANSPORTATION

To reduce the possibility of damage, observe the following precautions whenever transporting the game. Lower the backbox and secure it to the cabinet. Remove the legs and secure the game within the transporting vehicle.

GAME ASSEMBLY PROCEDURES (Refer to the Game Illustration on page 2)

1. Open the top of the carton and lay it on its side with the bottom of the cabinet down. Using the plastic banding strip as a handle, slide the game out of the carton.
2. Remove all packing material. Locate cabinet legs in filler packing inserts and assembly parts package in the cashbox. There should be four leg levelers, eight leg bolts, three pinballs and a large Allen Wrench used for securing the backbox.
3. Attach leg leveler from the parts package to each leg, make sure that each leveler is threaded through a hex nut before threading it into the leg.
4. Support rear of cabinet and attach rear legs using two leg bolts for each leg.
5. Support front of cabinet and attach front legs using two leg bolts for each leg.
6. While assuring that no cables are being pinched, carefully raise the backbox and secure it in its upright position by inserting the Allen Wrench in the hole in the back of the cabinet and rotating the wrench 270 degrees(3/4 turn).



GAME ILLUSTRATION

7. Remove the backbox keys from the clip on the inside of the coin door and unlock and carefully remove the backglass. Set the backglass aside.
8. Carefully remove the playfield glass and set it aside.
9. Check all connectors in the backbox for loose wire terminations. Reseat any loose wire by pushing in on the terminal.
10. Push on all connectors plugged into the CPU board, Sound Board, Power Supply Boards, and (on insert board) Display board to check that they are properly seated.
11. Check that the fuses on the Power Supply board, PPB board and fuse panel are seated properly.
12. Raise the playfield and support it, by connecting the strap located in the left rear of the cabinet, to the eyebolt on the playfield. (Use the instruction sheet provided in the game to see alternative methods of accessing the playfield bottom.)
13. Check all cabinet cable and playfield lamp board connector terminations.

14. Remove the Plumb tilt from the parts package and install on the panel on the inside left of the cabinet. Note that this game is not equipped with a ball roll tilt.

15. Lower the playfield and level the playfield side-to-side by adjusting leg levelers and using the 2 Way Level located beneath the pricing card on the bottom arch.

16. Using the 2 Way Level below the pricing card, adjust the pitch of the playfield to approximately 6.5 degrees.

NOTE

The playfield incline affects difficulty of play. Use the recommended incline; game difficulty is best varied using game adjustments.

17. Check the plumb tilt and adjust as required.

18. If desired, perform any self tests at this time. With the insert door closed, carefully reinstall and lock the backglass.

19. Place the three pinballs on the playfield near the outhole and carefully reinstall the playfield glass.

20. If desired, make game pricing and Add-A-Ball, Novelty, or 5-Ball Play adjustments at this time.

GAME OPERATION

STANDARD FEATURES

Insert coin(s), the game makes a sound for the first credit and generates sounds for each subsequent coin and the Player 4 display indicates the number of credits posted. Depress the credit button and a start-up sound is produced, the posted credits are reduced by one, Player 1 display flashes, Player 4 display indicates BALL 1, and a ball is served to the plunger trough. Additional players may be added by depressing the Credit button before the end of ball 1.

The second closure (adjustable) of the plumb bob tilt switch tilts the ball in play. Closure of the slam tilt switch in the coin door ends the current game(s).

At the end of each ball, earned bonuses are collected. At the end of the last ball for the last player and after bonuses are collected, the system produces a random 2-digit number (a multiple of 10; 00 to 90) for a Match feature (adjustable). Matching the last two digits of a player score with this number awards a credit. Players exceeding high score levels receive free credits (adjustable) and are able to enter their initials with the new High Score achieved. The game then proceeds into the game-over mode and then to the attract mode. A custom message (adjustable) can be displayed during the attract mode.

MANUAL PERCENTAGING

This game is equipped with Manual Percentage Adjustment.

As previously with our games, you can either set operator adjustments for a replay percent or you can set a fixed replay score.

If you set operator adjustments for a particular replay percent, the game will compute a recommended score to keep the game at that replay percentage. If a change is recommended and the game coin door is opened, the displays will indicate a recommended replay score to beat and make a sound to alert the operator. By pressing the start button, the score to beat will be changed to the recommended level. If you close the coin door or go into audit or adjustment mode, no score change will be made.

You may choose to ignore the recommended change; for example, you may not think last week's players were the usual crowd. Just close the door and the message will disappear without altering the existing level. Or you may choose to make a different score to beat adjustment; this is done by utilizing adjustment AD02.

GAME SPECIFIC FEATURES

1.) Laser Kick

The Laser Kick value is increased by rolling over flashing Return Lanes. Laser Kick is relit by shooting the right orbit a 1st time and collected by shooting the right orbit a 2nd time.

2.) HAT TRICK

Shoot 3 Hat Targets to lite Hat Trick. Shooting left orbit into hole allows Bullwinkle to pull animals out of his hat.

Rocky - Lites Extra Ball.

Rhino- Starts Rhino Bonus Countdown.

Lion - Start Jackpot.

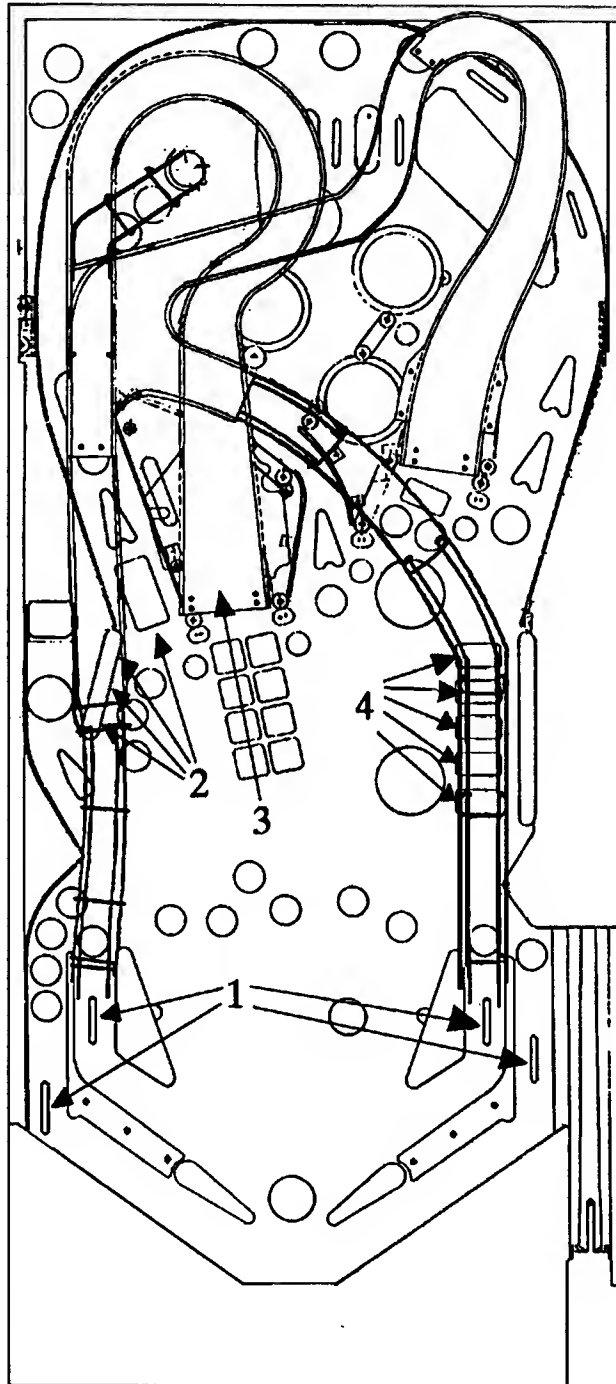
In Tri-ball Hat Trick starts and doubles Jackpot. Complete Hat Targets to award 3rd ball during Two Ball Play.

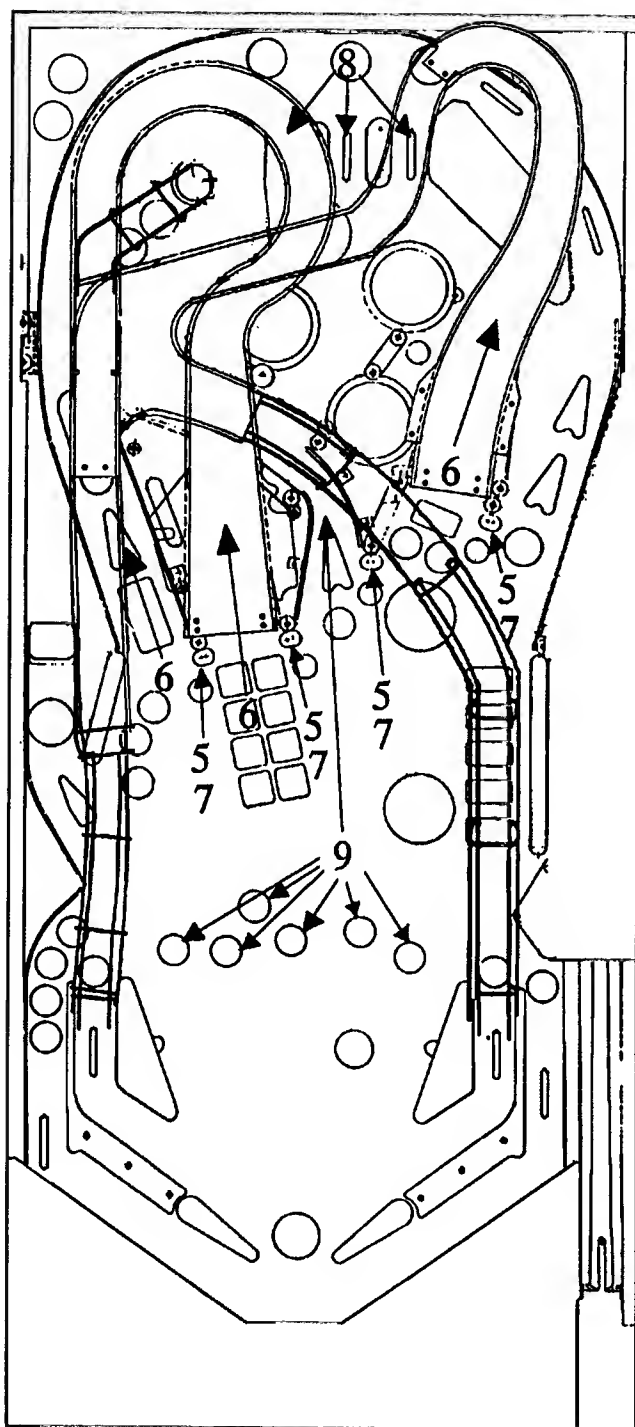
3.) BACK IN TIME

Shoot left ramp to collect flashing WABAC value. Collect all eight flashing values to start "Back In Time". Shoot left ramp to go back one century. The player will be prompted to enter initials for best time traveler.

4.) SAVE NELL

Completing Drop Targets advances value (5-4-3-2-1). When all lites are flashing Nell Timer begins. Hit Drop Targets to save Nell before time expires.





5.) TRI-BALL

Complete colored pie by hitting consecutive B.O.M.B. Targets. Shooting Alternating ramps without missing, spots piece of pie. Shoot right ramp to start TRI-BALL.

6.) Jackpot

Shoot "Hat Trick" during TRI-BALL to lite Jackpot on right ramp. Shooting Hat Trick while Jackpot is lit, will start Double Jackpot Timer. Shoot Right ramp to collect Jackpot. Left ramp increases Jackpot value by one Million for each ramp.

7.) Treasure Jackpot

Complete colored pie during TRI-BALL to start Treasure Timer. Shoot right ramp for One Hundred Million points.

8.) Skill Shot

Hit flashing Top Lane to collect value. Flippers change flashing lane.

9.) Mystery Moose Select

Shooting left or right Orbit spots Daisy. Completing 6 Daisies lites center hole for Mystery Select. Select using left or right flipper. Super Mystery Moose is lit by completing 12 Daisies then shooting center hole.

10.) Looping

Shooting left and right ramps increases Looping Award during timer.

11.) Loose Moose

All targets are worth 500k during timer.

12.) Super Pops

Each Bumper and Slingshot scores 500k per lit during timer. 10 pops advance to Duper Pops.

13.) Duper Pops

Each Bumper and Slingshot scores 1 Million per lit during timer. 10 pops advance to Super Duper Pops.

14.) Super Duper Pops

Each Bumper and Slingshot scores 2 Million during timer.

15.) Spin And Win

Shoot right ramp to collect Spinning value.

16.) Puzzle

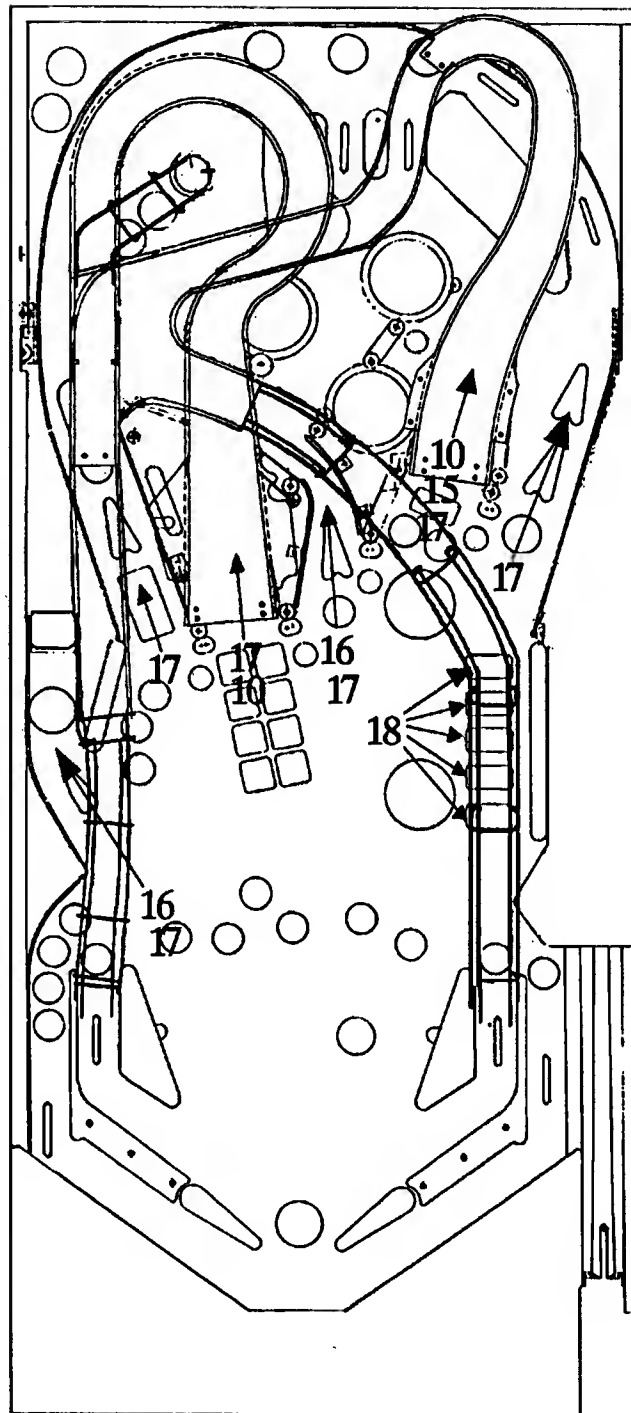
Complete Puzzle Feature by shooting either left or center hole. Puzzles start Rocket Shots, Spin and Win, 2 Mil Drops, Special or Extra Ball.

17.) Rocket Shots

Ramps, holes, and Orbits score 5 Million during timer.

18.) 2 Million Drops

Each Drop Target is worth 2 Million during timer.



AUDIT FUNCTIONS

GENERAL

There are 99 audit functions provided for accounting purposes and for evaluation of game difficulty adjustments. Audit functions are split into two groups. There are nine most-used audits (1 through 9) in a 'quick look' group and 89 less-used audits (11 through 99), in an 'expanded' group. The various auditing functions are summarized in the **AUDITING FEATURES TABLE** and, when accessed, are shown on the player score displays. The *Audit Number* is shown in the top of the display, the *Description* is shown next and the *Audit Total* in the display. bottom Access and control is provided from switches located on the inside of the coin door.

To access audit functions, open the coin door and make sure that the FORWARD/REVERSE switch is in the FORWARD (up) position. Depress the STEP switch and the display indicates AUDITS & ADJUSTMENTS. This indicates access to audit functions.

With the FORWARD/REVERSE push-button switch still in the FORWARD (up) position, depressing the STEP push-button switch advances through the audit functions one at a time. To review lower-numbered functions, set the forward/reverse push-button switch to the REVERSE (down) position and operate the STEP push-button switch.

To access expanded audits, operate the step push-button until AUDIT 10, EXPAND AUDITS is displayed. Set the choice to YES as indicated in the lower display by depressing the Game Start push-button and then depress the step push-button. The request is installed and Audit 11 is displayed. When you exit audits and adjustments, the Audit 10 setting is returned to off for the next time that a review of audits are required.

Audit totals may be reset to zero using Game Adjustment **ADJUSTMENT 11, AUDITS RESET**. Game adjustments (1 to 13 and 14 to 53) begin after the last audit function (10 or 99). Once audits functions have been recorded, and if no adjustments are required, you may return the game to the attract mode. If adjustments are required, continue pressing the STEP button until the game adjustments are reached. See Game Adjustments for details.

'QUICK LOOK' FUNCTIONS

Total Paid Credits (AUDIT 1) - the total number of paid credits is displayed.

Free Percent (AUDIT 2) is Free Total (E AUDIT 24) divided by Plays Total (E AUDIT 25).

Ball Time Average (in seconds) (AUDIT 3) is Total Play Time divided by Total Balls Played (AUDIT 10).

Average Game Time (AUDIT 4) is the Average Game Time expressed in minutes and seconds.

Coins (AUDIT 5, 6, 7 and 8) - These four audit totals are provided to show the amount of coins registered for the left, right, center, and 4th coin chutes, respectively.

Total Coins (AUDIT 9) is the total number of coins dropped through all 4 coin chutes.

Expand Audits (AUDIT 10) permits viewing of expanded audits.

Rocky & Bullwinkle

Audit Table

Audit Number	Audit Description	Audit Number	Audit Description
	Rocky & Bullwinkle PROM ID		
1	Total Paid Credits	51	Slam Tilts
2	Free Game Percentage	52	Special Lit
3	Average Ball Time	53	Extraball Lit
4	Av Game Time	54	Laser Kick Used
5	Coins Left	55	Freeze Used
6	Coins Right	56	Victory Ramps Awarded
7	Coins Center	57	# of 10X Made
8	Coins 4th Chute	58	# of Bonus Holds
9	Total Coins	59	Left Orbits
10	Expand Audits (ON/OFF)	60	Right Orbits
11	Balls Total	61	Left Ramp
12	Extra Balls Total	62	Right Ramp
13	Extra Ball Percent	63	TRIBALL Ready
14	Replay 1 Awards	64	TRIBALL Award
15	Replay 2 Awards	65	2 Ball to 3 Ball
16	Replay 3 Awards	66	Rerace Award
17	Replay 4 Awards	67	Jackpot Lit
18	Total Replays	68	Jackpot Awards
19	Replay Percent	69	Double Jackpots
20	Total Specials	70	Start Treasure Pot
21	Special Percent	71	Award Treasure Pot
22	Total Matches	72	Super Pops
23	Hi Score Wins	73	Duper Pops
24	High Score Percent	74	Super Duper Pops
25	Total Free Plays	75	Got Level 1 Pick
26	Total Games	76	Got Level 2 Pick
27	0.0 - 9.9 Million	77	Start Nell
28	10.0 - 24.9 Million	78	Award Nell
29	25.0 - 49.9 Million	79	Abridged Hat Trick
30	50.0 - 74.9 Million	80	Start Lion Jackpot
31	75.0 - 99.9 Million	81	Award Lion Jackpot
32	Over 100 Million	82	Start Rhino Jackpot
33	Average Scores	83	Award Rhino Jackpot
34	Games 1Player	84	Start Spin & Win
35	Games 2Player	85	Max Spin & Win
36	Games 3Player	86	Start Looping
37	Games 4Player	87	Max Loop Award
38	Attract Minutes	88	Start Fast Scoring
39	Cycles H.S. Reset	89	Max Fast Targets
40	Coins No Credit	90	Started Travel
41	Service Credits	91	Max Travel Loops
42	Proprietary	92	Start 2 M Drops
43	Proprietary	93	Max 2 M Drops
44	Proprietary	94	Start Rocket Shots
45	Proprietary	95	Max Rocket Shots
46	Proprietary	96	Fuse Lit
47	Total Buyin Games	97	Put Out Fuse
48	Drains Left	98	Puzzle Awarded
49	Drains Center	99	Full Hat Trick
50	Drains Right		

EXPANDED FUNCTIONS

Balls Total (Audit 11) is the total of regular and extra balls.

Extra Balls Total (Audit 12) is the total number of extra balls awarded.

Extra Ball Percentage (Audit 13) is Audit 12 divided by Plays Total (Audit 26).

Replay Awards (Audit 14 through 17) provide the total awards (credit, extra ball, or audit) for replay levels 1 through 4, respectively.

Total Replays (Audit 18) is the total awards (credits, extra balls, or audit only) for exceeding replay score levels.

Replay Percentage (Audit 19) is the Replay Total awards for exceeding replay score levels (Audit 18) divided by Plays Total (Audit 26).

Total Specials (Audit 20) is the total awards (credits, extra balls, or scores) for making specials.

Special Percentage (Audit 21) is Special Total (Audit 20) divided by Plays total (Audit 26).

Total Matches (Audit 22) is the total credits awarded for matching the last two digits of the score with the system-generated Match Number at the end of the game. Percentage of match credits will be adjustable from 0% to 10%, by Adj. 14 if enabled.

High Score Wins (Audit 23) is the total credits awarded for exceeding the high-score-to-date scores.

High Score Percentage (Audit 24) is High Score Wins (Audit 23) divided by Plays Total (Audit 26).

Total Free Plays (Audit 25) is the total free credits for replays, high-score-to-date, specials, and match.

Total Games (Audit 26) is the sum of Total Paid Credits (Audit 1) and Free Total (Audit 25). Note that free credits are not recorded in the Audit until they are actually used.

0.0 - 9.9 Million (Audit 27) provides the total number of games the Player's final score was between 0 and 9,999,990 points.

10.0 - 24.9 Million (Audit 28) provides the total number of games the Player's final score was between 10,000,000 and 24,999,990 points.

25.0 - 49.9 Million (Audit 29) provides the total number of games the Player's final score was between 25,000,000 and 49,999,990 points.

50.0 - 74.9 Million (Audit 30) provides the total number of games the Player's final score was between 50,000,000 and 74,999,990 points.

75.0 - 99.9 Million (Audit 31) provides the total number of games the Player's final score was between 75,000,000 and 99,999,990 points.

Over 100 Million (Audit 32) provides the total number of games the Player's final score was over 100,000,000 points.

Average Scores (Audit 33) provides the Average Score by adding the Final Score of each game to a table and dividing this sum by the Total Plays .

Games - Player (Audit 34 through 37) provide individual totals of 1- player, 2-player, 3-player, and 4-player games, respectively.

Attract Minutes (Audit 38) provides the number of minutes the game is in Attract Mode (Factory use).

Cycles High Score Reset (Audit 39) provides the number of times that the high score levels have been automatically reset (if enabled).

Coin No Credit (Audit 40) provides the number of times the coin switch was closed without awarding credit(s)-This option is used in multiple coin conditions.(ie. 2 quarters 1 Play)

Service Credits (Audit 41) provides the total number of Service credits added to the game. *See Game Diagnostics on page 19 for instructions regarding entry of Service Credits.*

Proprietary (Audit 42 - Audit 46) provide information to the game designer to aid in design development. (Factory use only.)

Total Buyin Games (Audit 47) provides the number of times a player utilized the Buy In Feature. (See E Ad 40)

Drains Left (Audit 48) provides the number of times the ball drained out the left drain.

Drains Center (Audit 49) provides the number of times the ball drained out the center drain.

Drains Right (Audit 50) provides the number of times the ball drained out the right drain.

Slam Tilts (Audit 51) provides the number of times the Slam Tilt switch was activated.

GAME SPECIFIC FUNCTIONS

Special Lit (Audit 52) provides the total number of times the Special light was enabled.

Extra Ball Lit (Audit 53) provides the total number of times Extra Ball light skill shot was enabled.

Laser Kick Used (Audit 54) provides the number of times the Laser Kick returned a ball into play.

Freeze Used (Audit 55) provides the number of times the Freeze Feature was enabled.

Victory Ramps Awarded (Audit 56) provides the number of times the Victory Ramp was Awarded.

of 10X Made (Audit 57) provides the number of times the 10X feature was enabled.

of Bonus Holds (Audit 58) provides the number of times Bonus Hold was enabled.

Left Orbits (Audit 59) provides the total number of left orbits completed.

Right Orbits (Audit 60) provides the total number of right orbits completed.

Left ramp (Audit 61) provides the total number of left ramps completed.

Right ramp (Audit 62) provides the total number of right ramps completed.

TRI-BALL Lit (Audit 63) provides the number of times the TRI-BALL Feature was lit.

TRI-BALL Award (Audit 64) provides the number of times the TRI-BALL Feature was awarded.

2 to 3 Ball (Audit 65) provides the number of times the TRI-BALL Feature was re-enabled by completing the Hat Trick Targets while 2 balls are still in play.

Rerace Award (Audit 66) provides the number of times the Rerace Feature was awarded.

Jackpot Lit (Audit 67) provides the number of times the Jackpot Feature was lit.

Jackpot Awards (Audit 68) provides the number of times the Jackpot was awarded.

Double Jackpots (Audit 69) provides the number of times the Double Jackpot was awarded.

Start Treasure Pot (Audit 70) provides the number of times the 100 Million Treasure was enabled.

Award Treasure Pot (Audit 71) provides the number of times the 100 Million Treasure was achieved.

Super Pops (Audit 72) provides the number of times the Super Pops Feature was achieved.

Duper Pops (Audit 73) provides the number of times the Duper Pops Feature was achieved.

Super Duper Pops (Audit 74) provides the number of times the Super Duper Pops Feature was achieved.

Got Level 1 Pick (Audit 75) provides the number of times that Level 1 was achieved by completing the letters in the word SELECT.

Got Level 2 Pick (Audit 76) provides the number of times that Level 2 was achieved by completing the letters in the word SELECT.

Start Nell (Audit 77) provides the number of times that the Sawmill Feature was enabled.

Award Nell (Audit 78) provides the number of times that Nell was successfully saved on the Sawmill Feature.

Abridged Hat Trick (Audit 79) provides the number of times that the Hat Trick was completed without entering the Vertical Up Kicker.

Start Lion Jackpot (Audit 80) provides the number of times that the Lion Jackpot Feature was enabled.

Award Lion Jackpot (Audit 81) provides the number of times that the Lion Jackpot Feature was awarded.

Start Rhino Jackpot (Audit 82) provides the number of times that the Rhino Jackpot Feature was enabled.

Award Rhino Bonus (Audit 83) provides the number of times that the Rhino Bonus Feature was awarded.

Start Spin & Win (Audit 84) provides the number of times that the Spin & Win Feature was enabled.

Max Spin & Win (Audit 85) provides the maximum number of times that the Spin & Win Feature was completed.

Start Looping (Audit 86) provides the number of times that the Looping Feature was enabled.

Max Loop Award (Audit 87) provides the maximum number of times that the Looping Feature was completed.

Start Fast Scoring (Audit 88) provides the number of times that the Fast Scoring (Loose Moose) Feature was enabled.

Max Fast Targets (Audit 89) provides the maximum number of switches closed during the Fast Scoring Mode.

Started Travel (Audit 90) provides the number of times that the Back in Time Feature was enabled.

Max Travel Loops (Audit 91) provides the maximum number of Loops completed while the Back in Time Feature was enabled.

Start 2M Drops (Audit 92) provides the number of times that the 2 Million Drop Target Feature was enabled.

Max 2M Drops (Audit 93) provides the maximum number of Targets completed while the 2 Million Drop Target Feature was enabled.

Start Rocket Shots (Audit 94) provides the number of times that the Rocket Shots Feature was enabled.

Max Rocket Shots (Audit 95) provides the maximum number of holes, loops and ramps completed while the Rocket Shots Feature was enabled.

Fuse Lit (Audit 96) provides the number of times that the Fuse Feature is enabled on the display.

Put Out Fuse (Audit 97) provides the number of times that the Fuse was successfully extinguished by pressing the fire button.

Puzzle Completed (Audit 98) provides the number of times that the Display Puzzle was completed.

Full Hat Trick (Audit 99) provides the number of times that the VUK Hat Trick feature awarded the Lion Jackpot, Rhino Bonus or an Extra Ball for Rocky.

GAME ADJUSTMENTS

GENERAL

There are 53 adjustable functions provided to vary difficulty of play and to periodically reset audits and the high score levels. The various game adjustments are summarized in the **Game Adjustments Table** and, when accessed, are shown on the player score displays. The *Adjustment Number* is shown in the top of the display, the *Description* is shown next, and the setting, in the bottom of the display. Access and control is provided from switches located on the inside of the coin door.

Game adjustments are accessed from the audit mode. With the audits displaying AUDIT 1 and the FORWARD/REVERSE switch in the REVERSE (down) position, depress the STEP switch and ADJUSTMENT 53 is shown at the top of the display, FACTORY RESTORE is shown in the middle of the display, and NO is shown in the bottom of the display. With the audits displaying AUDIT 10 or 99 and the FORWARD/REVERSE switch in the FORWARD (up) position, depress the STEP switch and ADJUSTMENT 1 is shown in the top of the display, REPLAY/MANUAL is shown in the middle of the display, and the setting is shown in the bottom of the display.

With the FORWARD/REVERSE switch in the FORWARD (up) position, depressing the STEP switch advances through the game adjustments one at a time. With it in the REVERSE (down) position, the STEP switch selects lower-numbered adjustments. To rapidly scroll through adjustments, hold the STEP switch depressed. Adjustment values are changed by operating the GAME START push-button. The FORWARD/REVERSE switch setting determines whether the values are increased or decreased. (With the FORWARD/REVERSE switch up, the value increases, with it down, the value decreases). When the STEP switch is depressed the display indicates REQUEST INSTALLED.

REPLAY AND GENERIC FEATURES

Replays may be adjusted either for fixed levels or for a system-adjusted manual percentage of replay awards. Four levels may be selected. Adjustments allow awarding of a credit or an extra ball as each level is exceeded. With the manual percentage feature, if the actual replay percentage is higher or lower than that desired, the game computes new recommended manual percentage score(s). When the coin door is subsequently opened the player displays indicate the recommended level and a sound is made to alert the operator of a potential change. This new level is entered into adjustments simply by pressing the game start push-button. (If the coin door is closed or you enter audits/adjustments or diagnostics, the replay level is not changed.)

REPLAYS (Adjustment 1 through 6)

ADJ.1 Replay Manual/Fixed

- **Manual:** Adjust for percentage of awards for replay levels (1% through 50%). Proceed to ADJ.02 and 03 for starting replay levels.
- **Fixed:** Lower the automatic value below 1% and Player 1 display indicates FIXED. Proceed to ADJ. 2 and 3 for fixed replay levels.

ADJ. 2 Start Replay

- **Manual:** Adjust the starting Replay 1 setting to between 20,000,000 and 9,999,000,000.

ADJ. 3 Levels Replay/Level 1,2,3 & 4 Replay

- Adjust the number of replay levels to be active (1 to 4). Any additional starting replay levels are automatically set to values higher than Replay 1
- Adjust Replay 1 level to between 20,000,000 and 9,999,000,000. (Same as Start Replay)
If ADJ. 3 is set for 2, adjust Replay 2 level to between 20,000,000 and 9,999,000,000.
If ADJ. 3 is set for 3, adjust Replay 3 level to between 20,000,000 and 9,999,000,000.
If ADJ. 3 is set for 4, adjust Replay 4 level to between 20,000,000 and 9,999,000,000.

Rocky & Bullwinkle Game Adjustment Table

Adjustment Number	Description	Factory Setting
1	Replay/Manual	10%
2	Start Replay	200,000,000
3	Levels Replay *	01
4	Game Awards	CREDIT
5	Limit Freegame	03
6	Limit Extraball	03
7	Game Rules	FACTORY
8	Game Price*	USA2
9	Game Cleaned	NO
10	Coin Reset	NO
11	Audits Reset	NO
12	Restore Hi Scores	NO
13	Expand Adjustments	NO
14	Match Percent	08
15	Balls Per Game	03
16	Tilt Warnings	01
17	Replay Boost	NO
18	Credits Limit	30
19	High Scores Allowed	YES
20	Hiscore 1 Awards	03
21	Hiscore 2 Awards	01
22	Hiscore 3 Awards	00
23	Hiscore 4 Awards	00
24	Backup World Record	300,000,000
25	Backup Hiscore 2	275,000,000
26	Backup Hiscore 3	250,000,000
27	Backup Hiscore 4	225,000,000
28	Backup Hiscore 5	125,000,000
29	Backup Hiscore 6	150,000,000
30	Reset H.S.T.D. Every	700
31	Clean Game Every	1500
32	Free Play	NO
33	Custom Message	ON
34	Attract Mode Music	ON
35	Flash Lamps	NORMAL
36	Coils Pulse	NORMAL
37	Level Adjust By	ANY
38	Install Country	USA
39	Next Game Promo	ON
40	Buy In Allowed	NO
41	Restart Game	NO
42	Extra Ball Percentage	25
43	Background Volume	100
44	Bill Validator	NO
45	Tournament Style	NONE
46	Learnit Style	50
47	Trigger Enable	YES
48	Spot Bomb Style	EASY
49	Rerace Criterion	HARD
50	Jackpot Criterion	EASY
51	Any Drop Wins Nell	YES
52	Spot Nell Style	FACTORY
53	Factory Restore	NO

* Some settings result in Drop-Down Tables- See Text

Adj. 4 Game Awards Set for replays to award: **CREDIT, EXTRA BALL, NONE** or **SPECIAL** (when score threshold is achieved a playfield special is lit).

Adj. 5 Limit FreeGame - Adjust for the maximum number of free games that may be accumulated per game; 0 to 9 .

Adj. 6 Limit Extra Balls - Adjust for the maximum number of extra balls that may be accumulated per game; 1 to 9 or OFF.

SINGLE-FUNCTION DIFFICULTY ADJUSTMENT (Adj. 7)

Any one of five INSTALL settings for this adjustment may be activated to automatically select settings for multiple adjustments affecting game difficulty. Use the Start button to choose the difficulty level you require and press the step button to activate the setting. After activation, the individual adjustments may be readjusted if desired. Refer to Install Adjustment Table for details.

Adj. 07 Game Rules - Set to **EXTRA EASY, EASY, FACTORY, HARD** or **EXTRA HARD**.

(Note - Additional game features not variable by the Expanded Adjustments may also change using this setting.)

Install Adjustment	Adj. 7 Extra Easy	Adj. 7 Easy	Adj. 7 Factory	Adj. 7 Hard	Adj. 7 Extra Hard
Adj.48 Spot Bomb Style	EASY	EASY	EASY	FACTORY	FACTORY
Adj.49 Rerace Criterion	EXEASY	EXEASY	HARD	EXHARD	EXHARD
Adj.50 Jackpot Criterion	EASY	EASY	EASY	HARD	HARD
Adj.51 Any Drop Wins Nell	YES	YES	YES	NO	NO
Adj.52 Spot Nell Style	EXEASY	EASY	FACTORY	HARD	EXHARD

NOVELTY / 5-BALL/ADD-A-BALL SETTINGS

The following three combinations are recommended for situations where local laws restrict certain game features regarding the use of replays or the number of balls per game:

Novelty Play Rules - Set to establish recommended settings for no free play or extra balls:

Adj. 1 Manual Replay = Fixed
Adj. 2 Start Replay = 00
Adj. 3 Levels Replay = None
Adj. 4 Game Awards = None
Adj. 5 Limit Freegame =0

Adj. 6 Limit Extra Balls = 0
Adj. 14 Match Percent = Off
Adj. 20 World Record Awards=0
Adj. 21-23 Todays 1-3 Awards= 0

5-Ball Play Rules - Set to establish recommended settings for 5-ball play:

Adj. 1 Manual Replay =07%
Adj. 2 Replay Start = 145,000,000
Adj. 3 Replay Levels = 01
Adj. 4 Game Awards = Credit
Adj. 5 Limit Freegame =3
Adj. 6 Limit Extra Balls = 3

Adj. 14 Match Percent = 04
Adj. 15 Balls/Game =5
Adj. 20 World Record Awards = 3
Adj. 21 Todays 1 Award= 1
Adj. 48 Spot BOMB Style =Factory
Adj. 49 Rerace Criterion =Hard

Adj. 50 Jackpot Criterion =Hard
Adj. 51 Any Drop Wins Nell =No
Adj. 52 Spot Nell Style = Hard

Extra Ball Settings-To disable awarding of credits and provide awards with an extra ball make the following adjustments:

Adj. 4 Game Awards = Extra Ball
Adj. 5 Limit Freegame = 0
Adj. 14 Match Percent = OFF

Adj. 19 Scores Highest = No
Adj. 20 to 23 World Record & Todays High Awards= 0

GAME PRICING (Adj. 8)

There are two methods available for coin switch programming; Standard and Custom. Standard pricing uses a single adjustment (Adj. 8) to select a pricing scheme shown in the **Standard /Custom Pricing Table**. Custom pricing is used to select additional pricing schemes defined by a Drop Down menu.

With Adj. 8 set to **CUSTOM** operating the step button again initiates a drop down menu representing coin switch pulses for the left, right, and center coin slots. The prescribes the number of pulses required for one credit. For example, if *Left Coin Pulses*, was set to 02 and *Coin Switch Pulses Required for 1 Credit*, to 01 a coin in the left slot would produce two credits. Further, if *Left Coin Pulses*, was set to 01 and *Coin Switch Pulses Required for 1 Credit*, to 02, two coins in the left slot would be required for one credit.

Coin Switch Pulses Required for Bonus Credit may be set to post bonus credits when a minimum amount of coins are inserted at one time. For example, if *Left Coin Pulses* was set to 01, *Coin Switch Pulses Required for 1 Credit* to 01 and *Coin Switch Pulses Required for Bonus Credit* to 04, one credit would be posted for each of the first three coins in the left slot and two credits for the fourth coin.

Standard/Custom Pricing - Set for the desired pricing scheme from the Standard Pricing Table as indicated in the Player 1 and 2 displays. For Custom Pricing, set to **CUSTOM**. When set to CUSTOM, the following adjustments are utilized to tailor each individual coin chute.

Left Coin Switch Pulses - Set the number of pulses registered for closure of the left coin switch; 00 to 99.

Right Coin Switch Pulses - Set the number of pulses registered for closure of the right coin switch; 00 to 99.

Center Coin Switch Pulses - Set the number of pulses registered for closure of the center coin switch; 00 to 99.

Coin Switch Pulses Required for 1 Credit - Set the number of coin switch pulses required to post one credit; 00 to 99.

Coin Switch Pulses Required for Bonus Credit - Set the number of coin switch pulses required to award the 1st bonus credit(s); 00 to 99.

Coin Switch Pulses Required for 2nd Bonus Credit - Set the number of coin switch pulses required to award the 2nd bonus credit; 00 to 99.

Credits awarded for 1st Bonus - Set the number of credits awarded for achieving the first Bonus level; 00 to 99.

CUSTOM PRICING TABLE

Coin Mechs				Plays/Coins	Adjustments							
Left	Right	Center	4th		Left Pulses	Right Pulses	Mid Pulses	4th Pulses	Pulses /Credit	Pulses /bonus	Pulses/ 2nd Bon	Credit/ 1st Bonus
25¢	25¢	\$1.00	n/u	1/25¢ 3/50¢ 1/25¢ 5/\$1.00 1/25¢/ 6/\$1.00	01 01 05	01 01 05	04 04 20	00 00 00	01 01 04	02 04 20	00 00 00	01 01 01
5SCH	10SCH	10SCH	n/u	1/10 SCH 1/10 SCH 4/30SCH	01 04	02 08	02 08	00 00	02 06	00 00	00 00	00 00
10P	£1	50P	20P	1/30P 2/50P 5/£1 1/50P 3/£1 1/30P 4/£1	01 01 01	15 15 12	06 05 05	02 02 02	03 05 03	00 00 00	00 00 00	00 00 00
20¢	\$1.00	n/u	n/u	1/60¢ 2/\$1.00	01	05	00	00	03	05	00	01

STANDARD PRICING TABLE

Adj. 8 Standard Pricing Select	Coin Mechs				Plays Per Coin			
	Left 1st	Center 2nd	Right 3rd	4th	1st	2nd	3rd	4th
USA 1-1 Coin 1 Play	25¢	\$1.00	25¢		1PLAY/1COIN	4PLAY/1COIN	1PLAY/1COIN	
USA 2-4 Coin 3 Play *	25¢	\$1.00	25¢		1PLAY/2COIN	3PLAY/1COIN	1PLAY/2COIN	
					2PLAY/3COIN	6PLAY/2COIN	2PLAY/3COIN	
					3PLAY/4COIN	9PLAY/3COIN	3PLAY/4COIN	
USA 3-2 Coin 1 Play	25¢	\$1.00	25¢		1PLAY/2COIN	2PLAY/1COIN	1PLAY/2COIN	
USA 4-2 Coin 1 Play	25¢		25¢			1PLAY/2COIN For the 1st Play		
						1PLAY/1COIN during BUY-IN		
USA 5-\$2.00 5 Plays	25¢	\$1.00	25¢		1PLAY/2COIN	2PLAY/1COIN	1PLAY/2COIN	
					5PLAY/8COIN	5PLAY/2COIN	5PLAY/8COIN	
USA 6- 50¢ - 3/\$1Bill	25¢	\$1.00	25¢		1PLAY/2COIN	3PLAY/1COIN	1PLAY/2COIN	
					2PLAY/4COIN	6PLAY/2COIN	2PLAY/4COIN	
USA 7-\$2.00 6 Plays	25¢	\$1.00	25¢		1PLAY/2COIN	2PLAY/1COIN	1PLAY/2COIN	
					2PLAY/4COIN	6PLAY/2COIN	2PLAY/4COIN	
Austria	5 SCH	10 SCH	10 SCH		1PLAY/2COIN	1PLAY/1COIN	1PLAY/1COIN	
					2PLAY/3COIN	3PLAY/2COIN	3PLAY/2COIN	
					3PLAY/4COIN			
Australia	20¢	\$1.00	\$2.00		1PLAY/5COIN	1PLAY/1COIN	2PLAY/1COIN	
Belgium	5f	20f	50f		1PLAY/4COIN	1PLAY/1COIN	5PLAY/2COIN	
Canada	25¢	25¢	\$1.00		1PLAY/2COIN	1PLAY/2COIN		
					2PLAY/3COIN	2PLAY/3COIN		
					3PLAY/4COIN	3PLAY/4COIN		
Denmark	1Kr	5Kr	10Kr	20Kr	1PLAY/3COIN	2PLAY/1COIN	4PLAY/1COIN	8PLAY/1COIN
French 1 *	1f	5f	10f	20f	1PLAY/3COIN	2PLAY/1COIN	5PLAY/1COIN	11PLAY/1COIN
					2PLAY/5COIN	5PLAY/2COIN	11PLAY/2COIN	
					5PLAY/10COIN	11PLAY/4COIN		
French 2	1f	5f	10f	20f	1PLAY/5COIN	1PLAY/1COIN	3PLAY/1COIN	7PLAY/1COIN
					3PLAY/10COIN	3PLAY/2COIN	7PLAY/2COIN	
					7PLAY/20COIN	7PLAY/4COIN		
French 3	1f	5f	10f	20f	1PLAY/3COIN	2PLAY/1COIN	4PLAY/1COIN	9PLAY/1COIN
					2PLAY/5COIN	4PLAY/2COIN	9PLAY/2COIN	
					4PLAY/10COIN	9PLAY/4COIN		
German 1	1 DM	2 DM	5 DM		1PLAY/1COIN	2PLAY/1COIN	6PLAY/1COIN	
					2PLAY/2COIN	4PLAY/2COIN		
					3PLAY/3COIN	6PLAY/3COIN		
German 2	1 DM	2 DM	5 DM		1PLAY/1COIN	2PLAY/1COIN	7PLAY/1COIN	
					2PLAY/2COIN	4PLAY/2COIN	21PLAY/3COIN	
					3PLAY/3COIN	6PLAY/3COIN		
German 3 *	1 DM	2 DM	5 DM		1PLAY/2COIN	1PLAY/1COIN	5PLAY/1COIN	
					2PLAY/3COIN	3PLAY/2COIN	10PLAY/2COIN	
					3PLAY/4COIN	5PLAY/3COIN	15PLAY/3COIN	
Italy 1	500L		500L		1PLAY/1COIN		1PLAY/1COIN	
Italy 2	500L		500L		1PLAY/2COIN		1PLAY/2COIN	
					3PLAY/4COIN		3PLAY/4COIN	
Japan			100¥				1PLAY/1COIN	
							3PLAY/2COIN	
Korea	100 Won		100 Won		1PLAY/1COIN		1PLAY/1COIN	
Netherland 1	1 Guilder	1 Guilder	2.5Guilder		1PLAY/1COIN	1PLAY/1COIN	3PLAY/1COIN	
Netherland 2	1 Guilder	2.5Guilder	5 Guilder		1PLAY/1COIN	3PLAY/1COIN	6PLAY/1COIN	
New Zealand 1	\$1.00		\$2.00		1PLAY/1COIN		2PLAY/1COIN	
New Zealand 2	\$1.00		\$2.00		1PLAY/1COIN		3PLAY/1COIN	
Spain	100Pts		500Pts		1PLAY/1COIN		6PLAY/1COIN	
Sweden	1 Skr	5 Skr	10 Skr		1PLAY/3COIN	2PLAY/1COIN	4PLAY/1COIN	
Swiss 1	1 SFR	2 SFR	5 SFR		1PLAY/1COIN	2PLAY/1COIN	6PLAY/1COIN	
Swiss 2	1 SFR	2 SFR	5 SFR		1PLAY/1COIN	3PLAY/1COIN	9PLAY/1COIN	
UK 1	10P	50P	£1	20P	1PLAY/5COIN	1PLAY/1COIN	3PLAY/1COIN	3PLAY/5COIN
					3PLAY/10COIN	3PLAY/2COIN		
UK 2	10P	50P	£1	20P	1PLAY/4COIN	1PLAY/1COIN	3PLAY/1COIN	1PLAY/2COIN
					2PLAY/8COIN	3PLAY/2COIN		2PLAY/4COIN
					3PLAY/10COIN			3PLAY/5COIN
UK 3	10P	50P	£1	20P	1PLAY/5COIN	1PLAY/1COIN	2PLAY/1COIN	2PLAY/5COIN
					2PLAY/10COIN	2PLAY/2COIN		
Yugoslavia	5 Dur		5 Dur		1PLAY/1COIN		1PLAY/1COIN	

ADDITIONAL GENERIC FEATURES

Adj. 9 Game Cleaned - When enabled (set to **YES**) the game cleaning counter will be reset to zero and Game Clean-Me message in Tech Alert will go out when STEP is depressed.(Also see Adj.31.)

Adj. 10 Coin Reset - When enabled (set to **YES**) all coin and paid credit totals will be reset to zero when STEP is depressed.

Adj. 11 Audits Reset - When enabled (set to **YES**) all audit totals except for coins and paid credits will be reset to zero when STEP is depressed.

Adj. 12 Restore High Score - When enabled (set to **YES**) the High Score Levels and associated initials will be restored to backup settings when STEP is depressed .

Adj. 13 Expand Adjustments - When set to **NO**, depressing the STEP push-button advances directly to Adj. 46, FACTORY RESTORE. When set to **YES**, depressing the STEP push-button sequences through the expanded adjustments. When exiting from expanded adjustments, this function is reset to **OFF** for the next time that adjustments are required.

Adj. 14 Match Percent- Set Match percent from **00%** to **10%** or **OFF**. At **00%** the match display occurs at the end of the game but never awards a credit.

Adj. 15 Balls Per Game - Adjust the number of balls per game; **2** to **5**.

Adj. 16 Tilt Warnings - Adjust the number of plumb bob tilt switch closures before the ball in play is tilted; **1** to **3** or **OFF**.

Adj. 17 Replay Boost - Set to **YES** or **NO**. When set to **YES**, exceeding a replay will set a temporary replay level for each time a replay level is surpassed. This new level will equal the player's final score (when the replay was awarded) for each following game, until the replays have all been played. At this time the previous level is resumed.

Adj. 18 Credits Limit - Adjust the maximum number of credits that may be posted; **4** to **50**.

HIGH SCORE LEVELS (Adj. 19 through 30)

There are four of the six high score levels with associated player initials that are displayed during the attract mode. This provides a high-score-to-date feature. When players exceed these levels, the player initials may be entered to replace the previous ones. These levels may be adjusted to award credits and to be reset to backup values after a selected number of games.

Adj. 19 Hiscodes Allowed - Set to enable or disable the four high score levels; **YES** or **NO**.

Adj. 20 World Record - Adjust the number of credits awarded for exceeding level 1 (the highest of the four levels); **0** to **5**.

Adj. 21 Highscore 2 Award- Adjust the number of credits awarded for exceeding level 1; **0** to **3**.

Adj. 22 Highscore 3 Award - Adjust the number of credits awarded for exceeding level 2; **0** to **2**.

Adj. 23 Highscore 4 Award - Adjust the number of credits awarded for exceeding level 3; **0** to **1**.

Adj. 24 Backup World Record - Adjust the score level to which the world record (the highest of the four levels) may be altered. This adjustment is not affected by Adj.30 (Factory Reset defaults to 7,500,000).

Adj. 25 Backup Highscore 2 - Adjust the backup score level to which level 1 may be reset.

Adj. 26 Backup Highscore 3- Adjust the backup score level to which level 2 may be reset.

Adj. 27 Backup Highscore 4- Adjust the backup score level to which level 3 may be reset.

Adj. 28 Backup Highscore 5- Adjust the backup score level to which level 4 may be reset.

Adj. 29 Backup Highscore 6- Adjust the backup score level to which level 5 may be reset.

Adj. 30 High Score Reset Every - Adjust the number of games between automatic resets of high score levels to backup settings and ball time averager adjustments; 100 to 900 or OFF (no reset or adjustment).

Adj. 31 Clean Game Every- Adjust the number of games in which the Clean Game message appears in Tech Alert to indicate the playfield needs cleaning. Adjustable from 100 to 2000.

Adj. 32 Free Play - When set to **YES**, no coins are required for games.

Adj. 33 Custom Message - When desired, this function is used to establish a custom message periodically displayed during the attract mode. Set the feature to **CHANGE** using the Credit button and depress STEP. The letter **A** is indicated in the first position of the Player 1 display. Vary the letter by operating the left and right flippers. With the desired letter indicated, depress the CREDIT button to lock in the letter and advance to the next display character. Repeat this procedure until the desired message is indicated in the Player 1 and 2 displays. At this time, depress the STEP push-button switch to advance to Adj. 34.

Adj. 34 Attract Mode Music - Set to **ON** (approximately every 3 minutes), or **OFF**.

Adj. 35 Flash Lamps- Set to **NORMAL**, **DIM** or **OFF**. When set to **NORMAL** the Flash Lamps are active, when **DIM** the Flash Lamps impulse power is reduced by 25% and when **OFF** the Flash Lamps do not flash.

Adj. 36 Coils Pulse- Set To **NORMAL**, **HARD** or **SOFT**. When **HARD** the coil pulse power is increased by 12.5% of the normal pulse rate. When set to **SOFT** the coil pulse power is reduced by 12.5% of the normal pulse rate. These adjustments are provided to compensate for Low Line or High Line voltage conditions where the solenoids appear to kicking too weak or too hard.

Adj. 37 Level Adjust by - When set to **OPERATOR**, the Manual Percentage Replay Adjustment can only be altered with the front door open (see manual page 3). When set to **ANY**, the Manual Percentage Replay Adjustment will display the message "PRESS START TO CHANGE REPLAY LEVEL" on power up if a change is recommended, and anyone operating the replay button will initiate the change to the replay score.

Adj. 38 Install Country- Set to **USA**, **GERMAN**, **FRENCH**, **AUSTRIA**, **BELGIUM**, **SWISS** or **CANADA**. Determines the default settings for the respective country for game pricing etc.

Adj. 53 Factory Restore-Depressing STEP without changing the value shown in the Player 4 Display locks in any custom message set with Adj.33 and returns the game to GameOver. Set the value to **ON** and depress STEP switch to revert all game adjustments to factory settings, clear the Custom Message and return to Game Over.

GAME SPECIFIC FEATURES (Adj. 39 TO Adj. 52)

Adj. 39 Next Game Promo- Set to **ON** or **OFF**. When set to **ON**, the game, in attract mode will randomly display a short promotion for our next game. When set to **OFF**, the game in attract mode will not generate any sounds or graphics referring to the next game.

Adj. 40 Buy In Allowed - Set to **YES** or **NO**. When set to **YES**, the game will display a countdown timer at the end of each game allowing the player to "Buy in" most of the features accumulated during the previous game. When set to **NO**, none of the previous game features will be retained and no countdown timer will appear.

Adj. 41 Game Restart -Set to **YES** or **NO**. When set to **YES**, a new game may be started during any ball after the first ball is completed. (Note-Pressing start during the first ball will add additional players.) When set to **NO**, The game disables the start button after the first ball until the final ball is in play.

Adj. 42 Extra Ball Percentage -Set from **0** to **50**. Allows the operator to adjust how frequently the Extra Ball feature is made available to the player.

Adj. 43 Background Volume - Set to **0**, **25**, **50**, **75** or **100** percent. Allows the operator to adjust the background music volume independantly from the normal game sounds.

Adj. 44 Bill Validator - Set to YES or NO. When set to YES , the display, in game attract mode, will show an "Insert Bill Animation". When set to NO, the display, in game attract mode will show "Insert Coin Animation".

Adj. 45 Tournament Style - Set to NONE, PINBALL EXPO, IFA-PAPA or HOME. This function determines the default conditions to quickly prepare a game for tournament play. When this setting is changed all audits will be reset and all adjustments will be initiated to the particular style selected. The game will then return to game over attract mode, as if a Factory Restore had been performed.

NONE - Same as a Factory Reset conditions.

IFPA-PAPA - Straight 50¢ play, no replay, no Extra Ball, no High Scores , 2 Tilt Warnings and No Match.

PINBALL EXPO- Same as IFA-PAPA settings except Free Play is enabled.

HOME-Sets game for Free Play, extra ball play, no replay, 10% Match and Extra Ball percentage = 30%.

Adj. 46 LearnIt Style - Set from 0 to 9,990 games in increments of 10. Determines how frequently the Manual Percentage adjustment evaluates whether or not to recommend a change to the score. When set to 0, a change may be recommended at the end of each game.

Adj. 47 Trigger Enabled - Set to YES or NO. When set to YES , the ball launch kicker will fire, during the Bomb Fuse animation, each time the launch button is pressed. When set to NO, the ball launch kicker will not operate during the Bomb Fuse animation.

Adj. 48 Spot Bomb Style -Set to EASY,FACTORY,or HARD. Determines how the ramps will spot the Targets that spell the word BOMB.

EASY	FACTORY	HARD
2 Alternate Ramps in sequence	3 Alternate Ramps in sequence	Never

Adj. 49 Rerace Criterion -Set to EXEASY,EASY,FACTORY, HARD or EXHARD. Determines during TRI-BALL, when a drained ball will be kicked back into play.

EXEASY	EASY	FACTORY	HARD	EXHARD
If no Jackpot was completed or TRI-BALL time is low.	If no Jackpot was completed	If TRI-BALL time is low.	If no Jackpot was completed and TRI-BALL time is low.	Never

Adj. 50 Jackpot Criterion -Set to EASYor HARD. When set to EASY, the Hat Trick shot is enabled immediately upon entering TRI-BALL. When set to HARD, the 3 Hat Trick Targets must be completed in TRI-BALL to enable the Hat Trick Shot. Completing the Hat Trick shot awards Jackpot.

Adj. 51 Any Drop Wins Nell - Set to YES or NO. When set to YES, striking any Drop Target saves Nell from the saw blade. When set to NO, all the Drop Targets must be completed to save Nell.

Adj. 52 Spot Nell Style -Set to EXEASY,EASY,FACTORY, HARD or EXHARD. Determines how many lamps are spotted at the begining of the first ball. Each additional ball in play will spot an additional lamp if the Sawmill feature is not enabled.

EXEASY	EASY	FACTORY	HARD	EXHARD
4 Lamps	4 Lamps	3 Lamps	2 Lamps	1 Lamp

GAME DIAGNOSTICS

The Data East Pinball system provides tests for sounds, digital displays, lamps, switches, and solenoids. Each feature may be tested manually or automatically using the STEP and FORWARD/REVERSE push-button switches inside the coin door and the Game Start push-button switch on the front of the cabinet. The automatic tests may be used for a quick verification of automatic test functions and the manual tests, for troubleshooting.

During game play, activation of switches and operation of coils with associated switches are monitored. If a switch is not made for 50 games it is considered bad. When operation of a coil should close or open a switch and does not, the coil is considered bad. In Game over attract mode, bad switches and coils (if any) are reported (See Tech Alert Description below). Note that reporting of an unused switch does not constitute a problem and that a bad coil could mean that the associated switch requires adjustment.

Wiring to switches, solenoids and controlled lamps uses color-coded wires that basically follows a resistor color-code scheme for the eight rows and eight columns. During the switch tests and during the discrete lamp test, identification of the color of the row and column wires are indicated in the Player 3 & 4 Displays. For example, making the right coin switch during the Switch Test results in the switch functional name (RIGHT COIN) shown in the Player 1 and 2 Displays, the row (WHT-YEL) and column (GRN-BRN) wire color codes shown in the Player 3 display, and the switch number shown in the Player 4 display.

BLK=Black
BRN=Brown
RED=Red
ORN=Orange
YEL=Yellow

GRN=Green
BLU=Blue
VIO=Violet
GRY=Grey
WHT=White

ENTERING DIAGNOSTICS

With the game in the game-over mode, open the coin door and make sure that the FORWARD/REVERSE push-button switch is set to REVERSE (down) and depress the STEP push-button switch. The Player displays will show the tollfree Customer Service number 1-800-KICKERS, that is 1-800-542-5377 (U.S. including Illinois) and the toll number (708) 345-7700 (Outside the United States). this indicates entry into game diagnostics.

Service Credits

With the phone number displayed depress the STEP push-button switch. The game now gives the technician the option of adding 1 to 5 service credits. These credits allow the technician to test-play the game without adding any counts to the coin audits (AU 01 & AU 05-AU 08). When the message appears, press and hold the Game Start pushbutton until the desired number of credits are shown on the display. Then press the step button again to add these credits to the game and enter Tech Alert. If no Service Credits are desired, press the step button with the initial message displayed.

Tech Alert

The player displays will now indicate if there are any Bad Switches (Switches that are closed, that should not be or switches that have not been activated in 50 games) it also indicates if the game requires cleaning, based on the number set in E Ad 31.

Burn-In Minutes

Pressing the step button while in Tech Alert mode will step game into Burn-in Mode(Factory use). At this stage pressing the game start button will cause the game to exercise all CPU I/O functions. This is provided to constantly exercise sounds, solenoids, etc...

To stop the test press the start button again. Cumulative Burn-In minutes will be displayed. To reset Burn-In minutes to 00, you must perform a Audit Reset Adj. 11 or a Factory Restore E Ad 43.

SOUND TESTS

The Data East Pinball sound system produces true digital stereo sound on left and right speakers and mono on a center speaker. During Sound tests, the bottom display shows the sound board circuit under test and the corresponding sounds are selected by operating the left and right flipper buttons to choose the circuit to be tested. Now press the start button to initiate the sound. Refer to the Sound Test Chart for the sound circuits displayed and the sounds produced.

The sound functions allow verification that all channels are functioning properly and that the speaker connections are correct. Speaker Phase Testing procedures follow for checking speaker connections.

SOUND TEST CHART

Auto/Manual Tests (Player 1 & 2)	Sounds Produced
LEFT SPEAKER CENTER SPEAKER RIGHT SPEAKER VOICE ROM1 (Loc U17) VOICE ROM2 (Loc U21) MUSIC TEST (Sound ROM Loc U7)	Left Sine (Left Speaker Only) Center Sine (All speakers) Right Sine (Right Speaker Only) "Hello there!" "Oh ...Boyl" Level 1 Through Level 3 Music

Speaker Phase Testing

Connections to each of the three speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other two, bass frequencies will not be produced properly and the overall sound quality will be poor.

To test for proper speaker phasing, use the sound test to cycle through the Left, Center, and Right Sine functions. If the Center Sine produces more volume and bass than the Left and Right Sines, the speakers are connected properly. If it produces the same or less, one speaker is connected improperly. To isolate and correct reversed speaker connections, one of two methods may be used.

1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the single-color wire (BLK, YEL or RED) is connected to the negative (-) terminal.
2. Disconnect the speaker output connector from the Sound Board and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers. Make sure that the positive battery terminal is connected to the positive lead (CN1-pin 1, 3, or 6) each time. As the connection is made, check speaker cone movement; proper connections are indicated by outward movement.

DIGITAL DISPLAY TEST

The Digital display utilizes a Dot Matrix Display Control board mounted in piggyback fashion to the display driver Board. The purpose behind this board is to provide more information (32 X 128 Dots) to the operator as well as displaying graphics to the player.

The board is controlled by a 68B09E microprocessor and it's personality ROMs (Unique to the Game) . It receives Data, Reset & Clock information from the CPU Board via the ribbon cable and sends back multiple Status and Busy signals to the CPU . This is to insure synchronized communication between the CPU and the Display Controller board.

The Drivers for the rows and columns are provided on 4 surface mounted integrated circuits on the Display driver board.

Automatic Test

To enter Display tests, operate the STEP push-button switch from the Sound Manual test. The displays will first illuminate one vertical column of dots in the Display. After a slight delay it will cycle one column from left to right. After a period of time, it will begin the Row test by lighting the top row of the display, then turning it off and illuminating the next row, until each row has been individually lit, while the other rows are off. The test will then turn all the dots in the display on except for one column. It will then cycle this blank column from left to right. After a period of time, it will begin the second Row test by blanking the top row of the display, then turning it on and blanking the next row, until each row has been individually blanked, while the other rows are on. The next test begins with every other dot lit, in both the rows and columns. These dots then go out, and the unlit dots light, resulting in an alternating checkerboard pattern. The test will then repeat these cycles again until advanced to the next test or until the power is removed. (Please Note- these tests may be interrupted at any time by operating the STEP push-button switch to advance to the next test.)

Laser Kick Test

This test provided to insure proper interaction between certain switches and their associated solenoids without entering game play. For example, by rolling the ball over the left outlane switch the Laser Kick should fire. If it kicks too early or too late, the switch actuator should be adjusted to compensate for this error. If it fails to fire, use the switch test or coil test to help determine the cause of failure. Note: During this function, similar tests may be performed on Vertical Up Kickers or Saucers in the game.

Switches

Switches are configured in an 8 x 8 matrix of columns (switch drives) and rows (switch returns) with up to 64 switches possible. The switch tests include three parts; switch test, active switches, and bad switches. Row and column wire colors are indicated in each test using corresponding resistor color code numbers.

Switch Test

From the Laser Kick test, operate STEP push-button switch. Player 1 and 2 displays indicate SWITCH TEST. Close each switch and observe the displays. The Player 1 and 2 displays will indicate the switch name, the Player 3 display indicates the row and column wire colors, and the Player 4 display indicates the switch number. When a switch is released, the name and number disappear until another switch is closed or the test is exited.

Active Switches

Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays indicate ACTIVE SWITCHES. If any switches are stuck closed (or made from the presence of a ball), the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors, and the switch numbers are indicated in the Player 4 display. This cycle continues until all switches are cleared or until the STEP push-button switch is depressed.

SWITCH MATRIX CHART

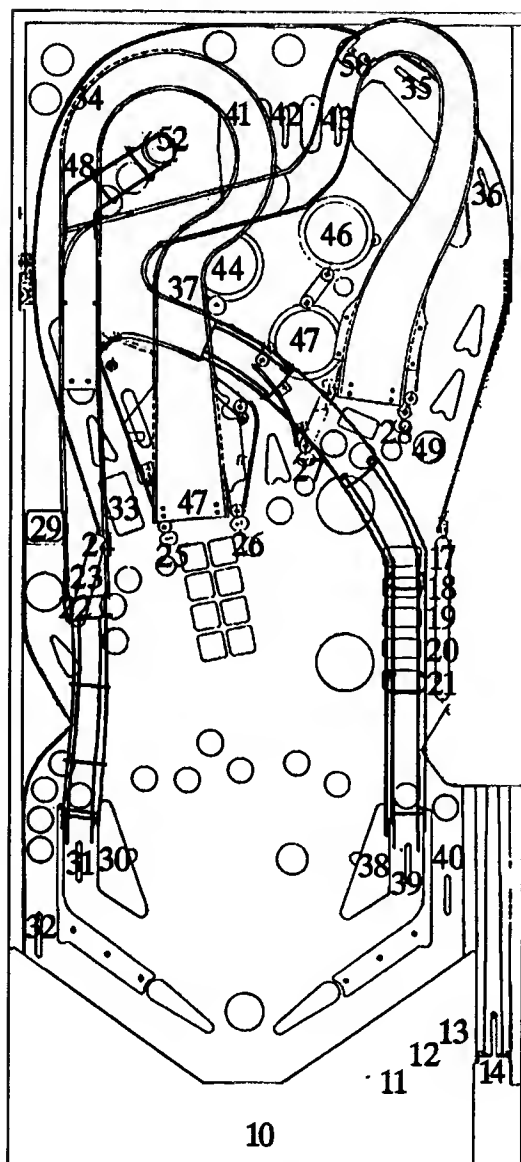
COLUMN ROW	1 Q55 GRN-BRN CN8-1	2 Q54 GRN-RED CN8-2	3 Q53 GRN-ORN CN8-3	4 Q52 GRN-YEL CN8-4	5 Q51 GRN-BLK CN8-5	6 Q50 GRN-BLU CN8-7	7 Q49 GRN-VIO CN8-8	8 Q48 GRN-GRY CN8-9
1 WHT-BRN CN10-9	Plumb Tilt 1	Launch Button 9	#1 DropTar. Top 17	"B" Stand-Up Target 25	Left Orbit Bottom 33	Left Top Lane 41	Right Ramp Entr. 49	Not Used 57
2 WHT-RED CN10-8	4th Coin 2	Outhole 10	#2 DropTar. 18	"0" Stand-Up Target 26	Left Orbit Top 34	Center Top Lane 42	Right Ramp Exit 50	Not Used 58
3 WHT-ORN CN10-7	Credit Button 3	Trough #1 Left 11	#3 DropTar. 19	"M" Stand-Up Target 27	Right Orbit Top 35	Right Top Lane 43	Not Used 51	Not Used 59
4 WHT-YEL CN10-6	Right Coin 4	Trough #2 Center 12	#4 DropTar. 20	"B" Stand-Up Target 28	Right Orbit Bottom 36	Left Turbo Bumper 44	VUK 52	Not Used 60
5 WHT-GRN CN10-5	Center Coin 5	Trough #3 Right 13	#5 DropTar. Bottom 21	Super VUK 29	Under Trough 37	Center Turbo Bumper 45	Not Used 53	Not Used 61
6 WHT-BLU CN10-3	Left Coin 6	Shooter Lane 14	Hat Target Bottom 22	Left Slingshot 30	Right Slingshot 38	Right Turbo Bumper 46	Not Used 54	Not Used 62
7 WHT-VIO CN10-2	Slam Tilt 7	Left EOS 15	Hat Target Middle 23	Left Return 31	Right Return 39	Left Ramp Entr. 47	Not Used 55	Not Used 63
8 WHT-GRY CN10-1	Not Used 8	Right EOS 16	Hat Target Top 24	Left Outlane 32	Right Outlane 40	Left Ramp Exit 48	Not Used 56	Not Used 64

Rocky & Bullwinkle - Switch Part Numbers

Switch Number	Description	Part No.
01*	Plumb Tilt	See Cabinet
02*	4th Coin	-
03*	Credit Button	500-5097-02
04*	Right Coin	180-5024-00
05*	Center Coin	180-5024-00
06*	Left Coin	180-5024-00
07*	Slam Tilt	180-5022-00
08	Not Used	-
09*	Launch Button	500-5410-02

Switch Number	Description	Part No.
10	Outhole	180-5011-00
11	Left Trough	180-5009-00
12	Center Trough	180-5009-00
13	Right Trough	180-5010-00
14	Shooter Lane	180-5100-01
15*	Left Flip. Cab	180-5048-01
16*	Right Flip. Cab.	180-5048-01
17	Drop Target Top	180-5092-01
18	Drop Target Top/Mid	180-5092-01
19	Drop Target Middle	180-5092-01
20	Drop Target Bot/Mid	180-5092-01
21	Drop Target Bottom	180-5092-01
22	Hat Target Bottom	500-5640-36
23	Hat Target Middle	500-5640-36
24	Hat Target Top	500-5640-36
25	Small Target "B"	500-5607-05
26	Small Target "O"	500-5607-06
27	Small Target "M"	500-5607-02
28	Small Target "B"	500-5607-04
29	Super VUK	180-5064-00
30	Left Slingshot	180-5054-00
31	Left Return Lane	500-5142-00
32	Left Outlane	500-5142-00
33	Left Orbit Bottom	180-5090-00
34	Left Orbit Top	500-5142-00
35	Right Orbit Top	500-5142-00
36	Right Orbit Bottom	500-5142-00
37	Under Trough	500-5633-00
38	Right Slingshot	180-5054-00
39	Right Return Lane	500-5142-00
40	Right Outlane	500-5142-00
41	Left Top Lane	500-5142-00
42	Center Top Lane	500-5142-00
43	Right Top Lane	500-5142-00
44	Left Turbo Bumper	180-5015-00
45	Center Turbo Bumper	180-5015-00
46	Right Turbo Bumper	180-5015-00
47	Left Ramp Enter	500-5382-00
48	Left Ramp Exit	500-5633-00
49	Right Ramp Enter	500-5382-00
50	Right Ramp Exit	500-5633-00
51	Not Used	-
52	VUK	180-5063-00
53	Not Used Through 64	-

* Indicates Cabinet
Switches



Switch Locations

LAMP TESTS

Controlled lamps are configured in an 8 x 8 matrix of columns (lamp drives) and rows (lamp returns) with up to 64 lamps possible. The lamp tests include four parts, all lamps, lamp return (row), lamp drive (column), and discrete (individual) lamps. Row and column wire colors are indicated in the discrete lamp test using corresponding resistor color code numbers.

All Lamps

From the Active Switch test, operate the STEP push-button switch. Player 1 and 2 displays indicate ALL LAMPS and all controlled lamps will light.

Lamp Returns

From the ALL LAMPS test, depress the STEP push-button switch. The top display indicates LAMP RETURNS and the Bottom display indicates wire color and the LAMP RETURN driver transistor. All controlled lamps in row 1 should be lit. Operating the Game Start push-button switch cycles through each of the rows separately.

Lamp Drives

From the LAMP RETURNS test, depress the STEP push-button switch. The Top display indicates LAMP COLUMNS and the bottom display indicates wire color and the LAMP DRIVES driver transistor. All controlled lamps in column 1 should be lit. Operating the Game Start push-button switch, cycles through each of the columns separately.

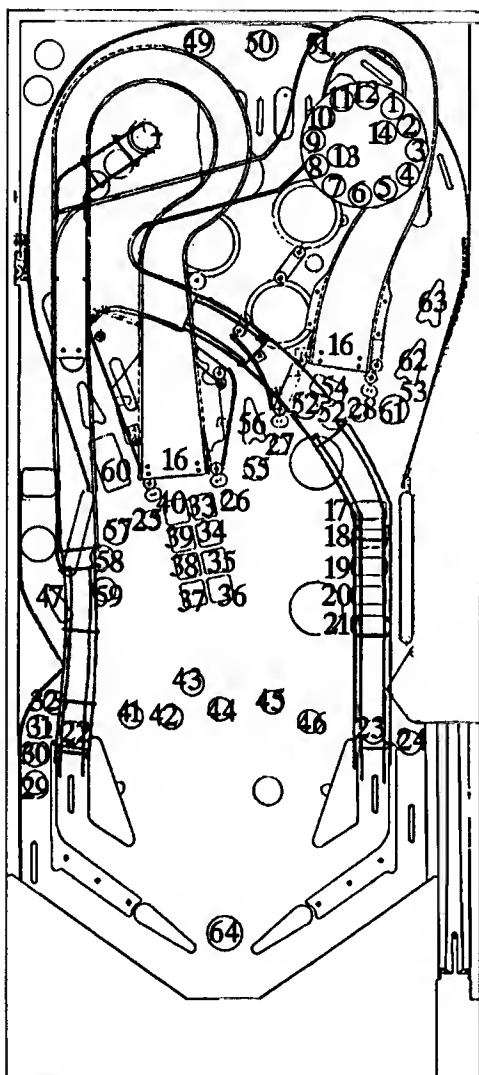
Single Lamp

From the LAMP DRIVES test, depress the STEP push-button switch. The top display indicates lamp name. The bottom display indicates the row and column wire colors and the lamp matrix number. Lamp 01 should light. With the FORWARD/REVERSE push-button switch in the FORWARD (up) position, operating the Game Start push-button switch selects higher-numbered lamps; with it in the REVERSE (down) position, Game Start selects lower-numbered lamps.

LAMP MATRIX CHART

COLUMN ROW	1 Q71 YEL-BRN CN7-1	2 Q70 YEL- RED CN7-2	3 Q69 YEL-ORN CN7-3	4 Q68 YEL-BLK CN7-4	5 Q67 YEL-GRN CN7-6	6 Q66 YEL-BLU CN7-7	7 Q65 YEL-VIO CN7-8	8 Q64 YEL-GRY CN7-9
1 Q72 RED-BRN CN6-1	Top Blue 1	Top Red 9	Drop Target 1 17	B Light 25	WABAC ??? 33	Daisy S 41	Left Top Lane 49	Top Hat Target 57
2 Q73 RED-BLK CN6-2	Middle Blue 2	Bottom Green 10	Drop Target 2 18	O Light 26	Looping 34	Daisy E 42	Center Top Lane 50	Middle Hat Target 58
3 Q74 RED-ORN CN6-3	Bottom Blue 3	Middle Green 11	Drop Target 3 19	M Light 27	Instant TRI-BALL 35	Daisy L 43	Right Top Lane 51	Bottom Hat Target 59
4 Q75 RED-YEL CN6-5	Top Yellow 4	Top Green 12	Drop Target 4 20	B Light 28	10 Million 36	Daisy E 44	TRI-BALL 52	Hat Trick 60
5 Q76 RED-GRN CN6-6	Middle Yellow 5	Pie TRI-BALL 13	Drop Target 5 21	Laser Kick 1 Mil 29	Lite Mystery Select 37	Daisy C 45	Right Ramp Entr. 53	Rhino Bonus 61
6 Q77 RED-BLU CN6-7	Bottom Yellow 6	Spin & Win 14	Left Return Lane 22	Laser Kick 3 Mil 30	Loose Moose 38	Daisy T 46	Jackpot 54	Lite Laser Kick 62
7 Q78 RED-VIO CN6-8	Bottom Red 7	Credit Button 15	Right Return Lane 23	Laser Kick 5 Mil. 31	Bomb Millions 39	Extra Ball 47	Lite WABAC 55	Special 63
8 Q79 RED-GRY CN6-9	Middle Red 8	Left Ramp Entr. 16	Right Outlane 24	Advance X 32	Super Pops 40	Launch Button 48	Mystery Select 56	Shoot Again 64

Lamp Number	Description
01	Top Blue
02	Middle Blue
03	Bottom Blue
04	Top Yellow
05	Middle Yellow
06	Bottom Yellow
07	Bottom Red
08	Middle Red
09	Top Red
10	Bottom Green
11	Middle Green



Lamp Locations

12	Top Green
13	Pie TRI-BALL
14	Spin & Win
15	Credit Button
16	Left Ramp Entrance
17	Drop Target 1
18	Drop Target 2
19	Drop Target 3
20	Drop Target 4
21	Drop Target 5
22	Left Return Lane
23	Right Return Lane
24	Right Outlane
25	BOMB Light
26	BOMB Light
27	BOMB Light
28	BOMB Light
29	Laser Kick 1 Mil
30	Laser Kick 3 Mil
31	Laser Kick 5 Mil
32	Advance X
33	WABAC ???
34	Looping
35	Instant TRI-BALL
36	10 Million
37	Lite Mystery Select
38	Loose Moose
39	Bomb Millions
40	Super Pops
41	Daisy SELECT
42	Daisy SELECT
43	Daisy SELECT
44	Daisy SELECT
45	Daisy SELECT
46	Daisy SELECT
47	Extra Ball
48	Launch Button
49	Left Top Lane
50	Center Top Lane
51	Right Top Lane
52	TRI-BALL
53	Right Ramp Entrance
54	Jackpot
55	Lite WABAC
56	Mystery Select
57	Top Hat Target
58	Middle Hat Target
59	Bottom Hat Target
60	Hat Trick
61	Rhino Bonus
62	Lite Laser Kick
63	Special
64	Shoot Again

FLASH LAMP / COIL TESTS

Twenty-Two regular (pulsed under microprocessor control) coil drivers are provided to switch ground to coils. The Left/Right relay is used in conjunction with drives 1 through 8 to switch +32 volts between coils or flash lamps; these sets are termed "left" and "right". This relay is located on the PPB board which provides isolation diodes and current limiting resistors. This effectively provides 29 regular coils.

Flash Lamp

From the Single Lamp test, depress the STEP push-button switch. All Flash lamps will fire randomly. This allows the Technician to easily spot any burned out bulbs and replace them without stepping through the tests below.

Automatic Test

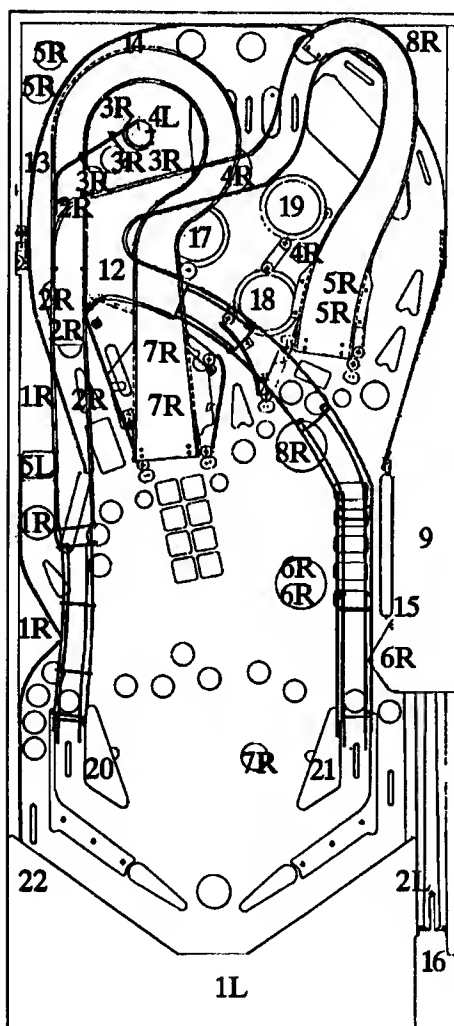
From the Flash Lamps test, depress the STEP push-button switch. Player 1 and 2 displays indicate ALL COILS. The test pulses each regular solenoid or flash lamp sequentially with the coil/flash lamp name indicated in the Player 1 and 2 displays and the wire colors in the Player 3 and 4 displays.

Select Coil

From the Coil Test, depress the STEP push-button switch. Player 1 and 2 displays indicate SELECT COIL and then the name of 1st drive, the wire colors are indicated in the Player 3 and 4 displays. Operate either Flipper push-button switch to select the coil or flash lamp to be tested. With the desired drive number indicated in the Player 4 display, depress the START push-button switch to cause it to be pulsed repeatedly.

RETURN TO GAME OVER

From the Select Coil test, depress the STEP push-button switch once. The game returns to the game-over mode.

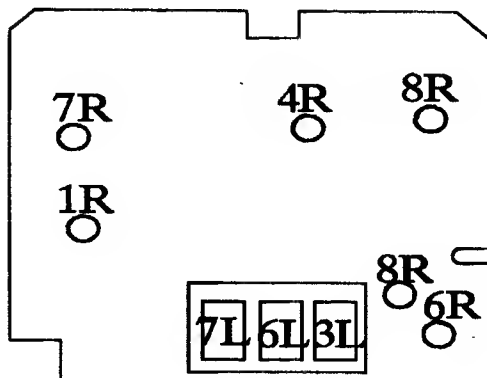


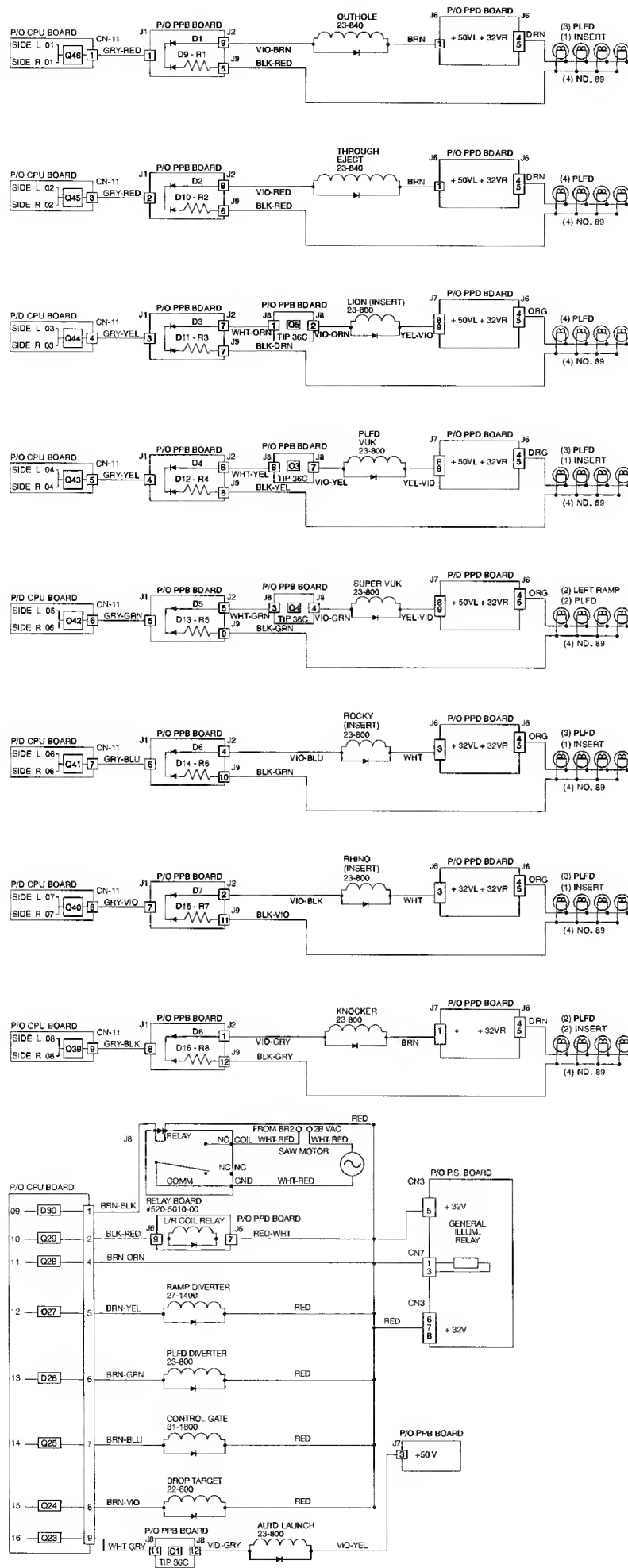
CPU Controlled Auxillary Solenoids

Coil Number	Coil Description	Control Line (CPU to Coil)	Power Line (PS to Coil)	Drive Transistor	Coil Type
17	Left Turbo Bumper	BLU-BRN CPU CN19-7	RED PS CN3-6	Q11	23-800
18	Center Turbo Bumper	BLU-RED CPU CN19-4	RED PS CN3-6	Q9	23-800
19	Right Turbo Bumper	BLU-ORN CPU CN19-3	RED PS CN3-6	Q8	23-800
20	Left Slingshot	BLU-YEL CPU CN19-6	RED PS CN3-6	Q10	23-800
21	Right Slingshot	BLU-GRN CPU CN19-8	RED PS CN3-6	Q12	23-800
22	Laser Kick (See Schematic)	BLU-BLK CPU CN19-9	VIO-YEL PPB J7-3	Q13	23-800

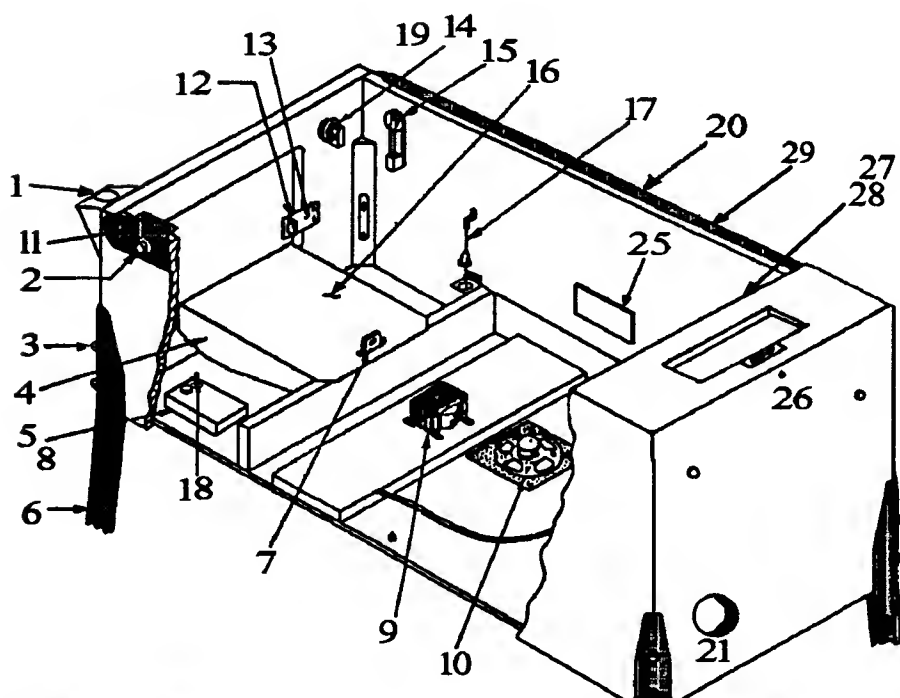
Flipper Solenoids

Coil Description	Flipper GND CPU to Coil	Flipper GND Sw. to Flip.PCB	Power Lines FlipPc to Coil	Coil Type	Power Input To Flip PCB
Left Flipper 090-5020-30	ORN-GRY CPU CN19-2	BLU-GRY CN1-9	GRY-YEL CN2-1,2	23-900	BLK-WHT 50VDC
Right Flipper 090-5020-30	ORN-VIO CPU CN19-1	BLU-VIO CN1-1	BLK-WHT CN1-1	23-900	GRY, GRY-GRN 6VAC



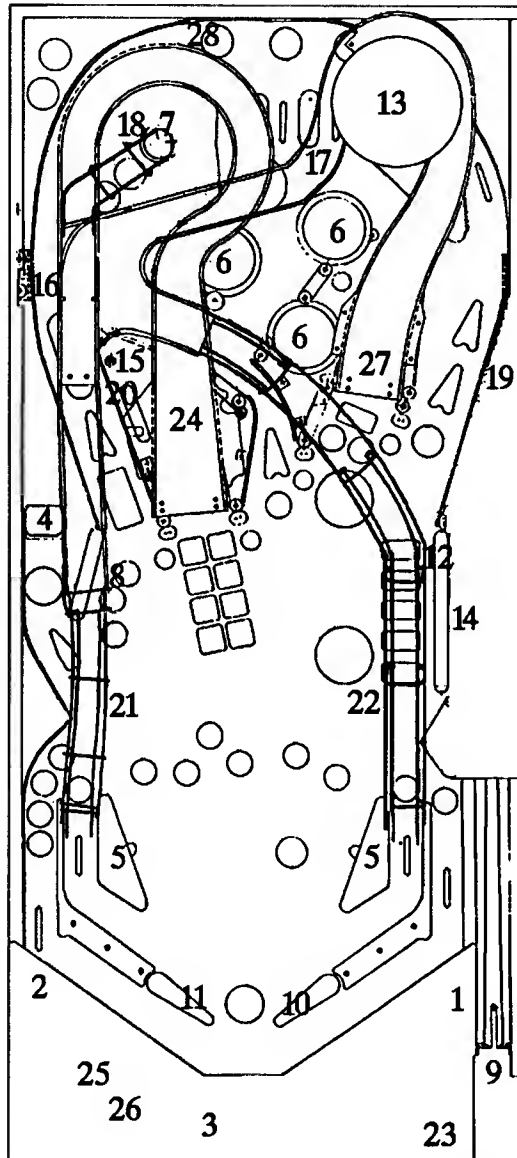


CABINET PARTS ILLUSTRATION



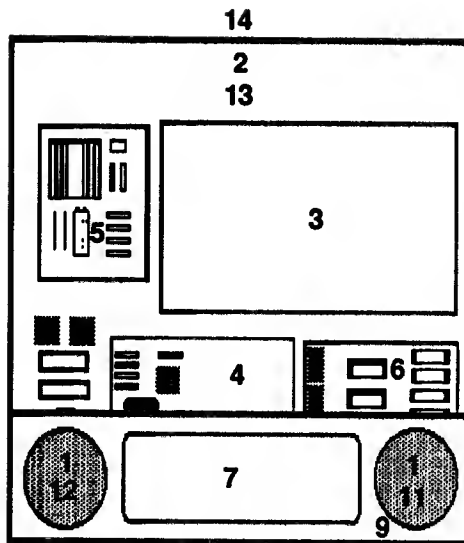
Item	Description	Part No.
1	Push Button Assy.	500-5410-01
2	Flipper Button	500-5026-38
3	Leg Bolt (Black)	231-5000-01
4	Cash Box Bottom	545-5090-00
5	On/Off Switch DP/ST	180-5001-00
6	Leg (Black)	535-5020-30
7	Lock Bracket-Cash Box	535-5215-00
8	Power Input Box Assy	515-5360-00
9	Transformer	010-5003-00
10	Speaker-Round (8")	031-5005-00
11	Side Armor-Right	535-5010-31
12	Memory Protect Switch	180-5000-00
13	Memory Protect Switch Bracket	535-6409-00
14	Start Switch	180-0028-00
15	Flipper Leaf Switch	180-5048-01
16	Cash Box Top	535-5013-03
17	Plumb Bob Tilt Assembly	500-5023-00
18	Volume Control	123-5000-00
19	Playfield Glass (Tempered) *	660-5001-00
20	Side Armor -Left	535-5010-32
21	Recessed cup for Line cord	545-5122-00
22	Service Switch (Not Shown)	180-5012-00
23	Front Molding Lockdown Assy.*	500-5020-00
24	Front Molding -Black *	500-5021-10
25	S.S.Flipper P.C.B.	520-5033-02
26	Roto Lock Bottom	355-5006-01
27	Rear Plastic Extrusion for Playfield Glass	545-5038-00
28	Mounting Foam for Extrusion	626-5004-00
29	Plastic Channel (Right & Left)	545-5017-00
30	Backbox Hinge Left *	535-6172-00
31	Backbox Hinge Right *	535-6172-01
32	Leg Leveler *	500-5017-00
33	Coin Door with Validator Blank*	500-5018-17

Playfield - Major Assemblies



Item	Description	Part No.
1.	Ball Feed Assy(Trough Eject)	500-5012-01
2.	Kick Back Assembly	500-5080-00
3.	Outhole Assy.	500-5082-00
4.	Super VUK	500-5116-04
5.	Sling Shot Assy	500-5226-00
6.	Turbo Bumper Assy.	500-5227-00
7.	Vertical Up Kicker	500-5326-00
8.	3 Bank Standup	500-5384-01
9.	Ball Launch Assy.	500-5477-01
10.	Flipper Assy. Right	500-5606-75
11.	Flipper Assy Left	500-5606-76
12.	5 Bank Drop Target Assy	500-5621-05
13.	Clock Assembly	500-5627-00
14.	Nell's Log Assembly	500-5638-00
15.	Diverter Assembly	515-5704-00
16.	Diverter Assembly	515-5733-01
17.	Ball Return Ramp	500-5634-00
18.	VUK Ramp	535-6363-00
19.	Shooter Lane Ramp	535-6391-00
20.	Underchute Ramp	535-6407-00
21.	Wire Ramp (Left)	535-6416-00
22.	Wire Ramp (Right)	535-6417-00
23.	Bottom Arch Assy.	545-5302-04
24.	WABAC Ramp (Plastic)	500-5632-00
25.	Level (Horizontal)	670-5000-00
26.	Level (Vertical)	670-5001-00
27.	Ball Entrance Ramp	500-5637-00
28.	Gate Lift Coil	515-5711-00

Individual part breakdowns for most of these assemblies can be found on pages 34 through 41 and 65 through 71.



Item	Description	Part No.
1	Speakers	031-5004-00
2	Back Box Lock	355-5008-00
3	CPU †	520-5003-03
4	PPB Board	520-5021-05
5	Power Supply	520-5047-01
6	Sound Board †	520-5050-01
7	Dot Matrix ‡	520-5052-XX
8	Display Controller Board †	520-5055-00
9	Speaker Housing	545-5180-01
10	Screened Back Glass *	830-5222-00
11	Speaker Grill (Right)	830-5619-01
12	Speaker Grill (Left)	830-5619-00
13	Back Box Lock Plate	535-5860-00
14	Bullwinkle Antler Plastic	830-5438-00

* Not Shown

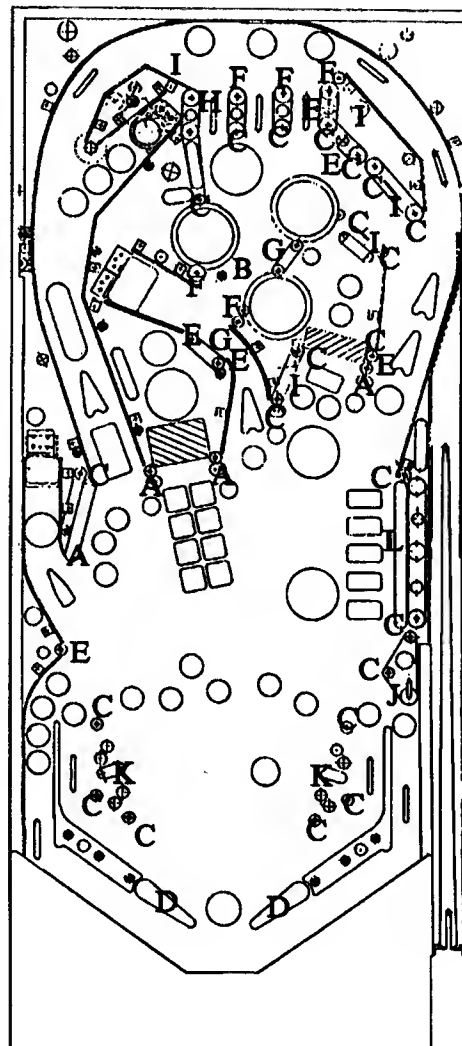
‡ Indicate Manufacturer

† When ordering PC Boards with ROMs
please specify game name

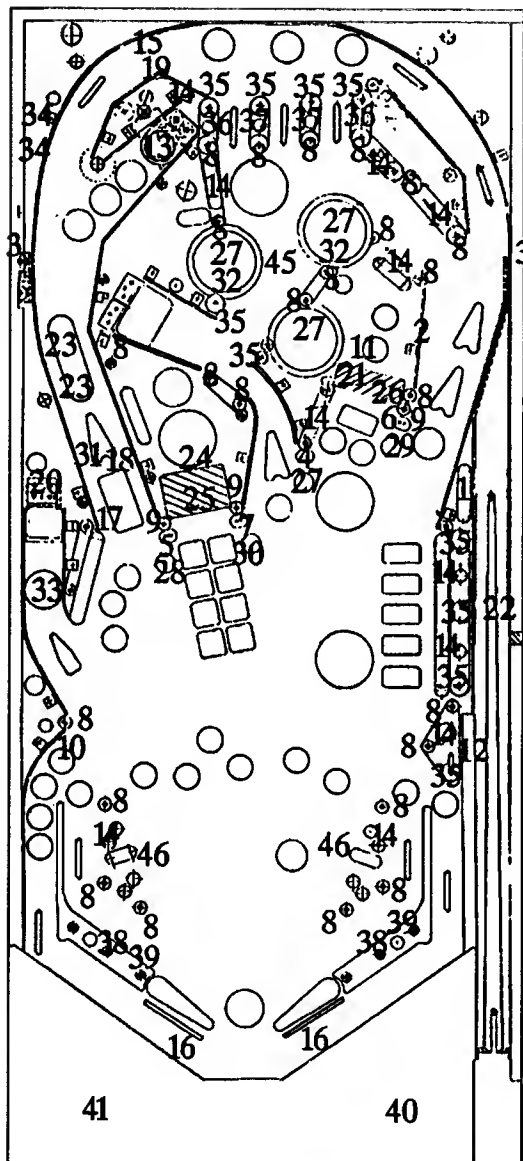
See Page 67 for Insert assembly.

RUBBER PARTS ILLUSTRATION

Item	Description	Part #
A	Bumper Post (4)	545-5009-00
B	Bumper Rubber (1)	545-5105-00
C	Post Rubber (24) Short	545-5151-00
D	Flipper Rubber (2)	545-5277-00
E	$\frac{3}{16}$ " (6)	545-5348-01
F	$\frac{5}{16}$ " (5)	545-5348-02
G	$\frac{3}{4}$ " (2)	545-5348-04
H	1" (1)	545-5348-05
I	$1\frac{1}{4}$ " (4)	545-5348-06
J	$1\frac{1}{2}$ " (1)	545-5348-07
K	$2\frac{1}{2}$ " (2)	545-5348-09
L	3" (1)	545-5348-10



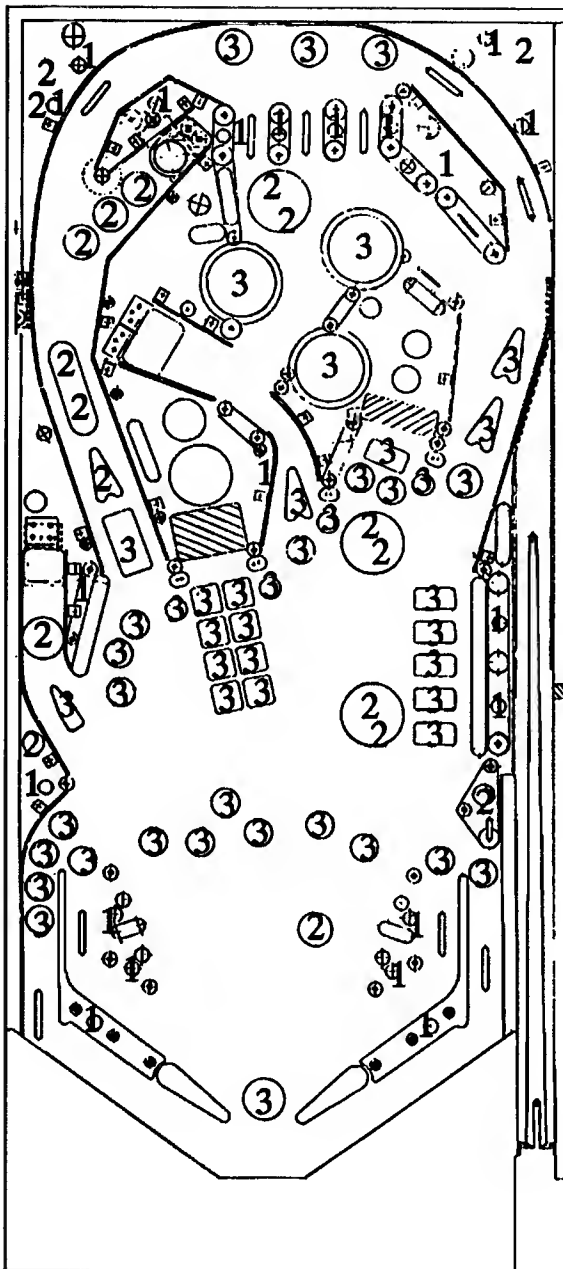
Playfield Parts



Note:
See page 25 for switch part numbers

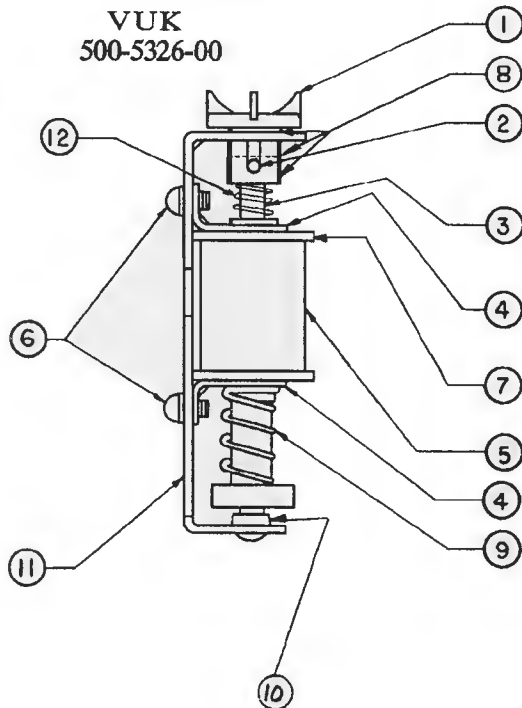
No.	Description	Part No.
1.	Spacer 1"	254-5000-04
2.	Wire Form	500-5042-00
3.	Pivot Brkt Assy	500-5329-00
4.	Narrow Target	500-5607-02
5.	Narrow Target	500-5607-04
6.	Narrow Target	500-5607-05
7.	Narrow Target	500-5607-06
8.	Metal Standoff (23)	530-5035-01
9.	Bumper Post (3)	530-5127-00
10.	Side Rail Guard	535-5008-02
11.	Ball Return Ramp	535-5026-00
12.	Outlane Adjustable Plate	535-5091-01
13.	Ball Stop Brkt	535-5273-00
14.	Wire Form 1" (11)	535-5300-05
15.	Rebound Hinge	535-5372-00
16.	Snubber Wire	535-5373-01
17.	Switch Protector	535-6539-00
18.	Rebound Mtg Brkt	535-5742-00
19.	Ball Gate Flap	535-6043-00
20.	Ball Deflector	535-6424-00
21.	Ramp Entrance Plate	535-6428-00
22.	Sliding Brkt Nell's Log	535-6483-00
23.	Slotted Brkt.	535-6518-00
24.	Gate Mtg Brkt.	535-6522-00
25.	Ramp Gate	535-6523-00
26.	Ramp Gate	535-6523-01
27.	Lite Cover RED	545-5014-02
28.	Lite Cover Green	545-5014-04
29.	Lite Cover Blue	545-5014-05
30.	Lite Cover Yellow	545-5014-06
31.	Wire Gate Mntg. Brkt.	535-6488-01
32.	Bumper Cap	545-5225-01
33.	Ball Guide Rail	535-6492-06
34.	SB Mini Mars	550-5031-02
35.	Small Plastic Post (10)	550-5034-01
36.	Lite Hood Clear One Side	550-5035-01
37.	Lite Hood Clear	550-5036-01
38.	Return Lane Guide	550-5037-01
39.	Return Lane Lower	550-5042-01
40.	Pricing Card	755-5040-00
41.	Instruction Card	755-5042-00
42.	Decal	820-5083-01
43.	B/W Decals	820-5083-XX
44.	B/W Ramp Decals	820-5086-XX
45.	Mylar Pad	820-5815-00
46.	Slingshot protectant	820-5821-00
47.	Mylar protectant	820-5827-00
48.	Screened Playfields	830-5122-00
49.	Screened Plastic Sets	830-5445-XX

Lamp Bulb Part Numbers



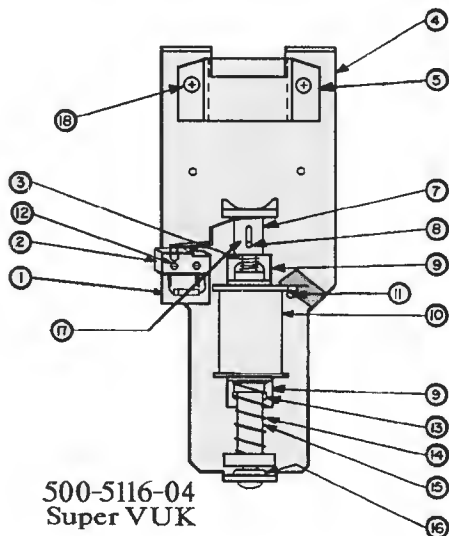
Item	Description	Part Number
1	#44 Bulb	165-5000-44
2	#89 Bulb	165-5000-89
3	#555 Bulb	165-5002-00
4	# 906 Bulb	165-5004-00

VUK
500-5326-00



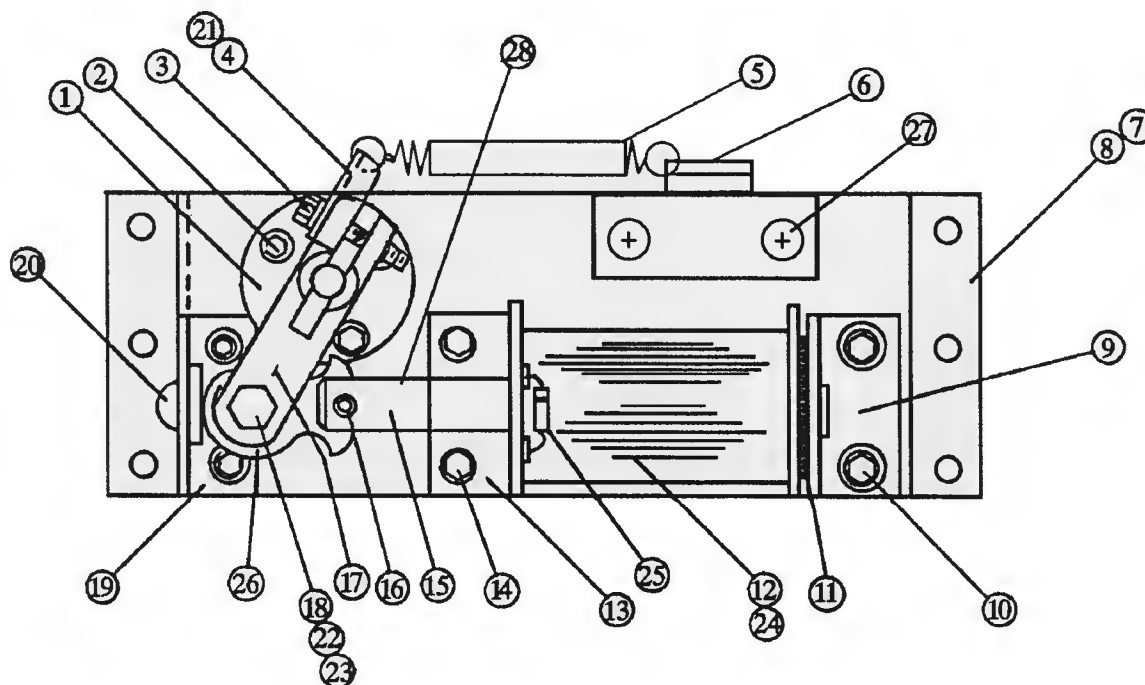
Item	Description	Part No.
1	Vert. Kick. Cap	545-5227-00
2	Pin $\frac{3}{32}$ X $\frac{7}{16}$	251-5004-00
3	Plunger Assy.	515-5352-00
4	Coil Retainer Brkt.(2)	535-5203-01
5	Coil 23-800	090-5001-01
6	#8-32 X $\frac{1}{4}$ "	232-5300-00
7	1N4004 Diode	112-5003-00
8	Compression Rings(3)	270-5010-00
9	Spring	266-5009-00
10	Bumper	545-5105-00
11	VUK Bracket	535-0230-00
12	Cap Spring	266-5025-00
13*	Sw. Insulator	545-5193-00
14*	Micro Switch	180-5063-00
15*	2-56 X $\frac{1}{2}$ Screw(2)	237-5806-00
16*	Lock Washer	242-1201-00
17*	Hex Nut	238-1101-00

* Indicates not shown



500-5116-04
Super VUK

Item	Description	Part #
1	Sw. Insulator	545-5193-00
2	Micro Switch	180-5064-00
3	Cap Spring	266-5025-00
4	Ball Kickup Mtg. Brkt.	535-5298-00
5	Ball Guide Brkt.	535-6047-00
6	# 6-32 x $\frac{3}{8}$ SEMS (2)*	232-5201-00
7	Vert. Kick. Cap	545-5227-00
8	Pin $\frac{3}{32}$ x $\frac{7}{16}$	251-5004-00
9	Coil Retainer Brkt.(2)	535-5203-00
10	Coil 23-800	090-5001-01
11	1N4004 Diode	112-5003-00
12	2-56 x $\frac{1}{2}$ Screw (2)	237-5806-00
13	# 6-32 x $\frac{1}{4}$ Phil.M.S.	232-5200-00
14	Spring	266-5009-00
15	Plunger Assy.	515-5352-00
16	Bumper	545-5105-00
17	Compression Ring (3)	270-5010-00
18	#6-32 x $\frac{1}{4}$ SEMS	232-5200-00



Item	Description	Part #	Item	Description	Part #
1	Flipper Bushing	545-5070-00	15	Plunger, Link & Pawl	515-5051-00
2	#6 x ³ / ₈ Hex Hd.scr.	234-5000-00	16	Pin	251-5000-00
3	#10-32 x ³ / ₄ Soc.Hd.scr.	232-2206-12	17	Pawl	530-5070-00
4	Spring Brkt. (left)	535-6431-00	18	10-32 x ³ / ₄ Shoulder Bolt	231-5019-00
5	Flipper Return Spring	265-5029-02	19	Rebound Brkt.	535-5279-00
6	Spring Bracket	535-6469-00	20	Rubber Bumper	545-5105-00
7	Flipper Base (left)	515-5077-02	21	Spring Brkt. (right)	535-6422-00
8	Flipper Base (right)	515-5077-01	22	Bushing (inside Link)	530-5139-00
9	Coil Stop Brkt.	515-5346-00	23	10-32 Elastic Stop Nut	238-1306-00
10	¹ / ₄ -20 x ³ / ₈ Soc.Hd.scr.	231-2507-06	24	Coil Sleeve	260-0003-00
11	Spring Washer	269-5002-00	25	1N4004 Diode	112-5003-00
12	Coil 23-900	090-5020-30	26	Flipper Link	545-5219-00
13	Front Brkt.	515-5129-00	27	#8 ³ / ₈ Pan Hd.Thr.Form	237-5821-00
14	#8 x ³ / ₈ Hex Hd.Scr.	234-5100-00	28	Plunger & Link Ass'y.	515-5052-01

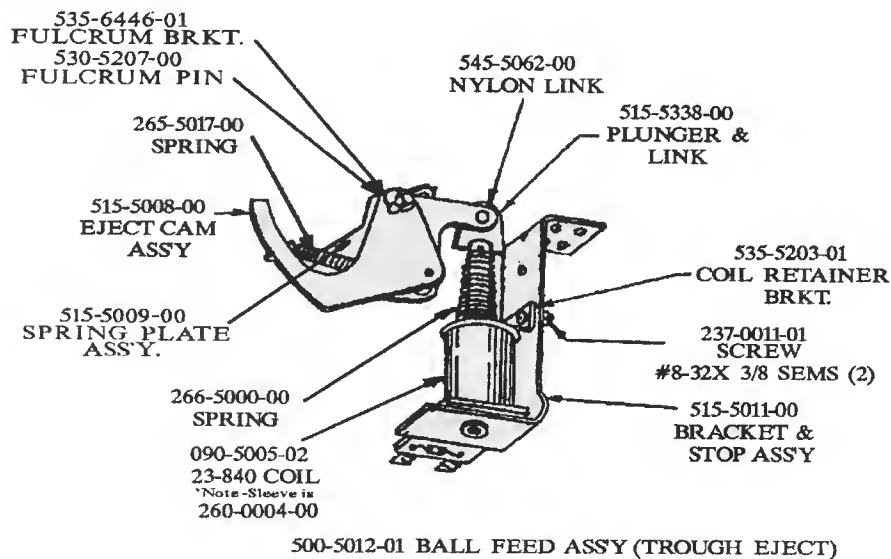
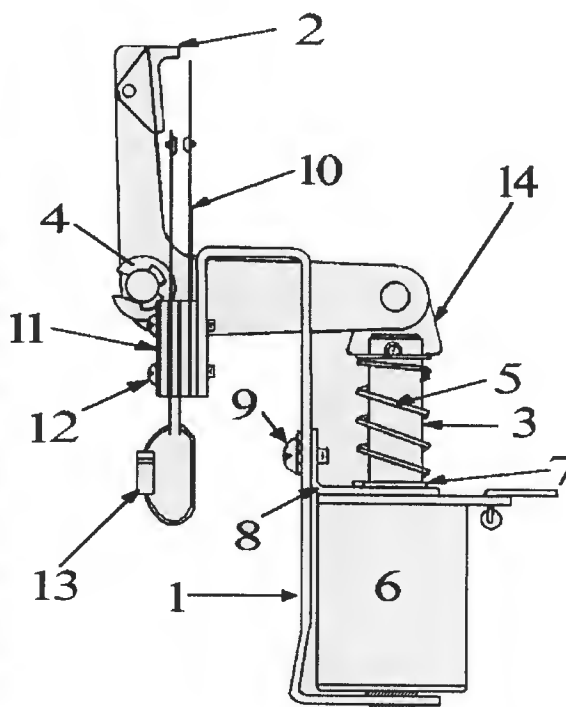
Flipper Assemblies

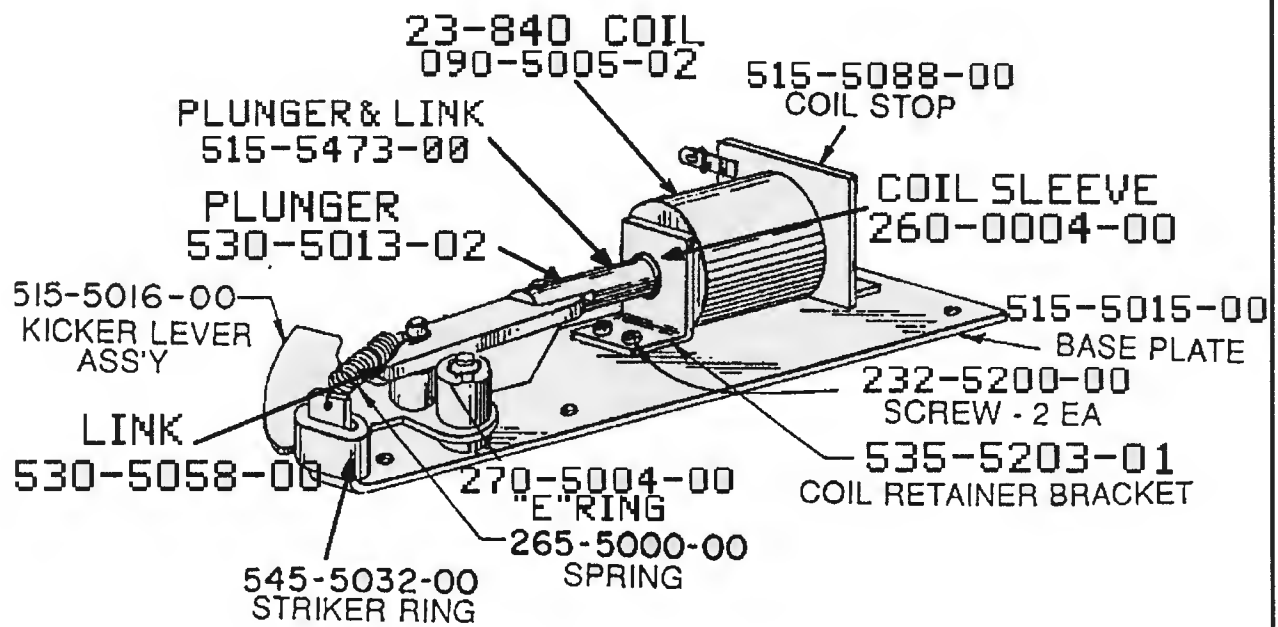
500-5606-75 Right

500-5606-76 Left

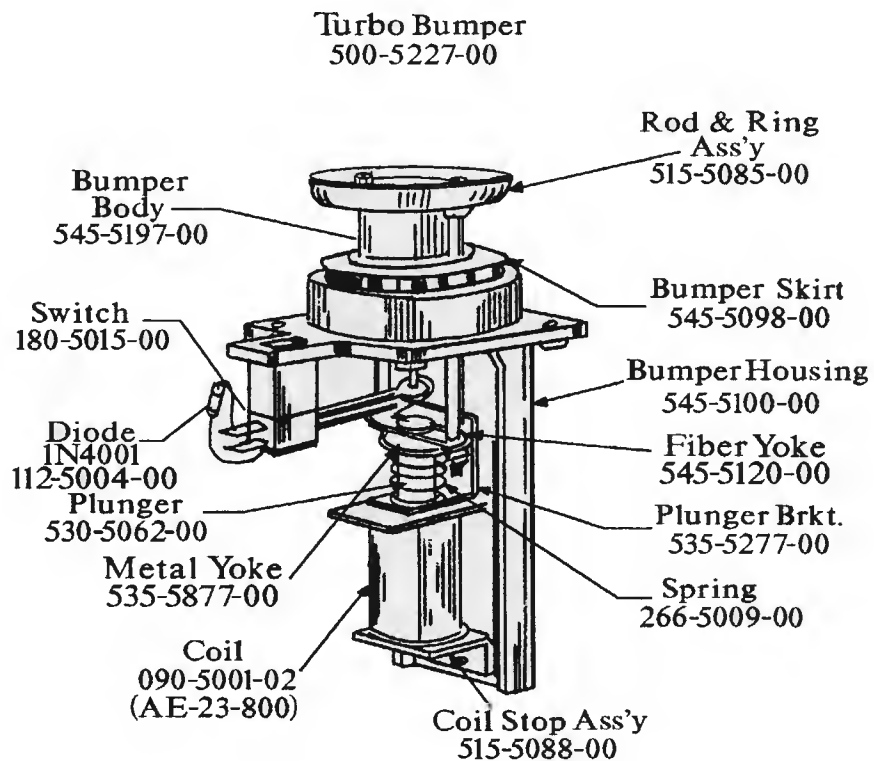
Slingshot Assembly 500-5226-00

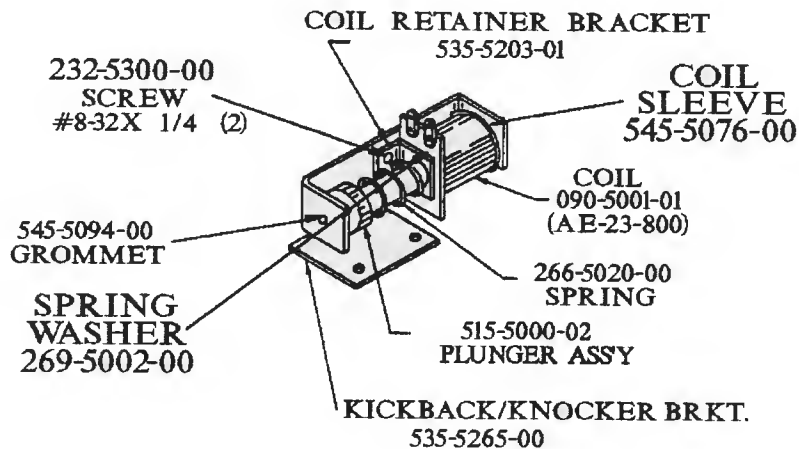
Item	Description	Part No.
1	Slingshot Bracket	515-5339-00
2	S.S. Arm & Tip Assy.	515-5340-00
3	Plunger & Link Assy.	515-5338-00
4	1/4 Retaining Ring (2)	270-5002-00
5	Spring	266-5020-00
6	23-800 Coil w/Sleeve	090-5001-02
7	Coil Sleeve	260-0004-00
8	Coil Retainer	535-5203-01
9	#8-32 X 1/4" Screw (2)	232-5300-00
10	Slingshot Switch (2)	180-5054-00
11	Tension Plate (2)	535-5846-00
12	#4-40 X 1/2" Screw (4)	237-5837-00
13	Diode 1N4004 (2)	112-5004-00
14	Link	545-5062-00



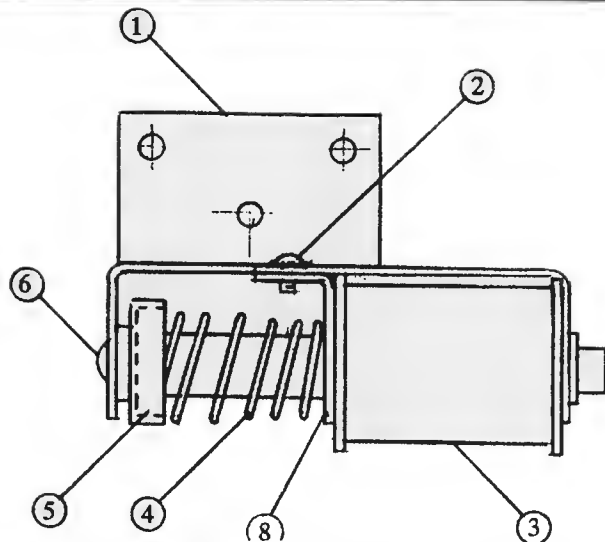


500-5082-00 OUTHOLE BALL RETURN ASSY



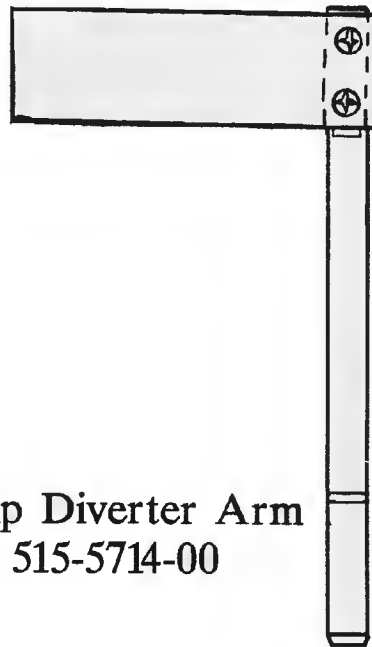
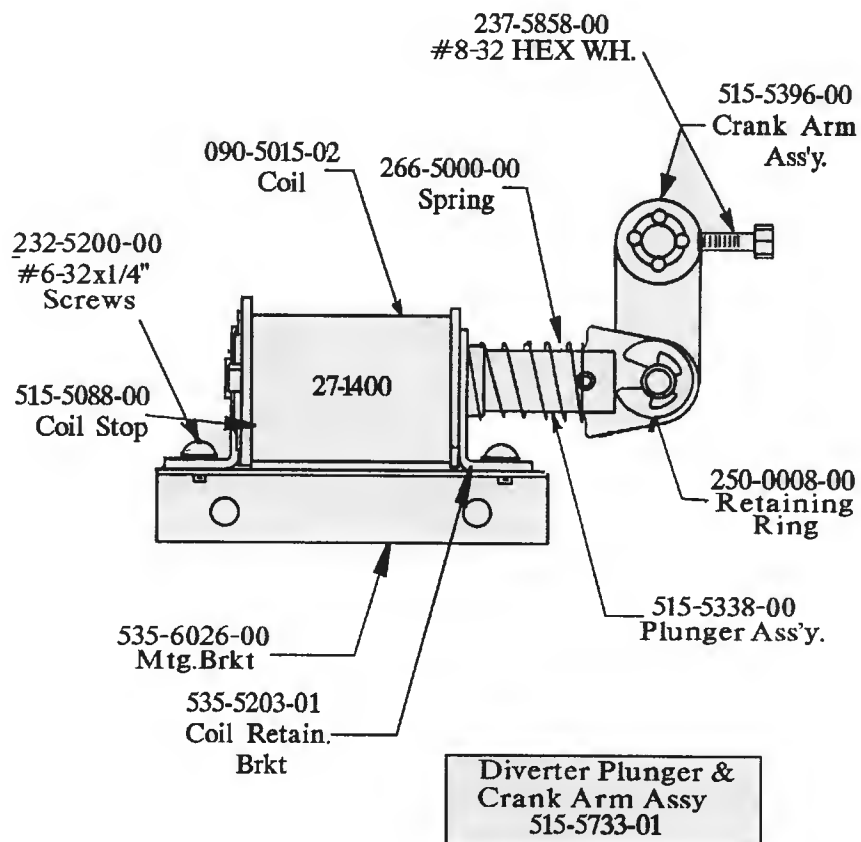


**KICKBACK &
KNOCKER ASSEMBLY 500-5081-00**

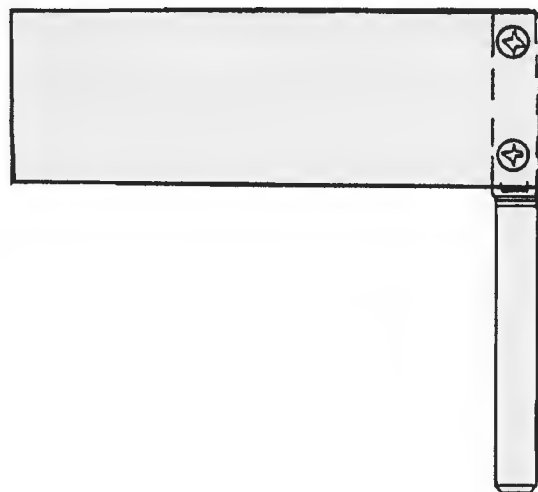
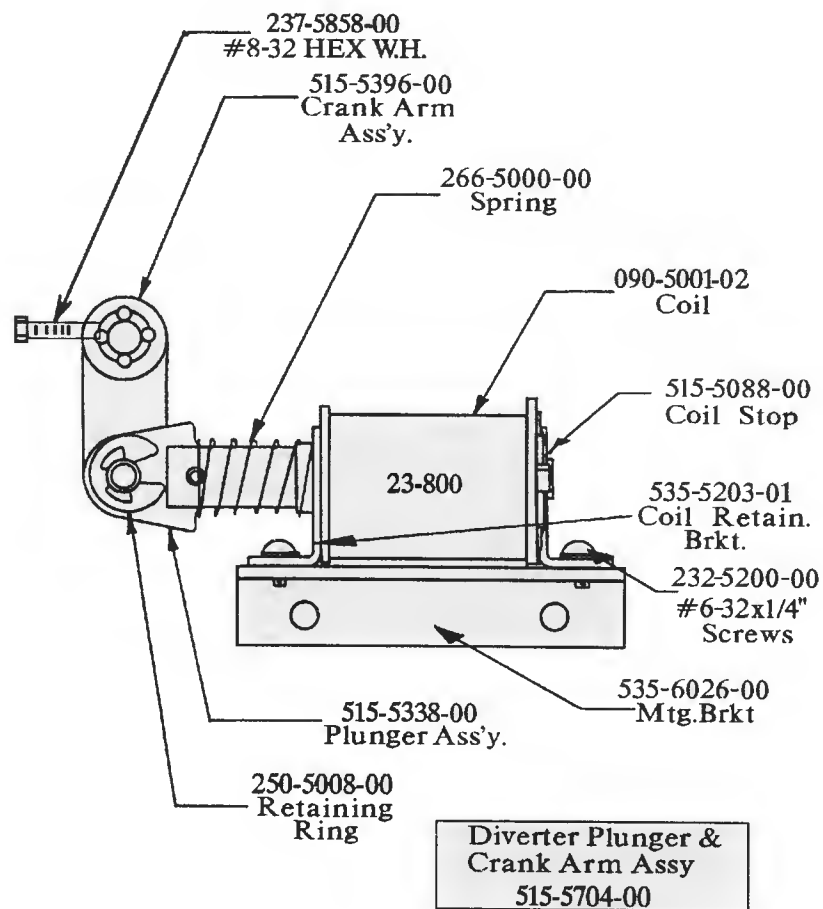


Item	Description	Part #
1	Coil Mtg. Brkt.	535-6385-00
2	8-32x1/4 Sems.(2)	232-5300-04
3	Coil 24-940	090-5036-01
4	Spring	266-5020-00
5	Plunger Ass'y.	515-5000-02
6	Grommet	545-5105-00
7	1N4004 Diode	112-5003-00
8	Coil Retainer Brkt.	535-5203-01

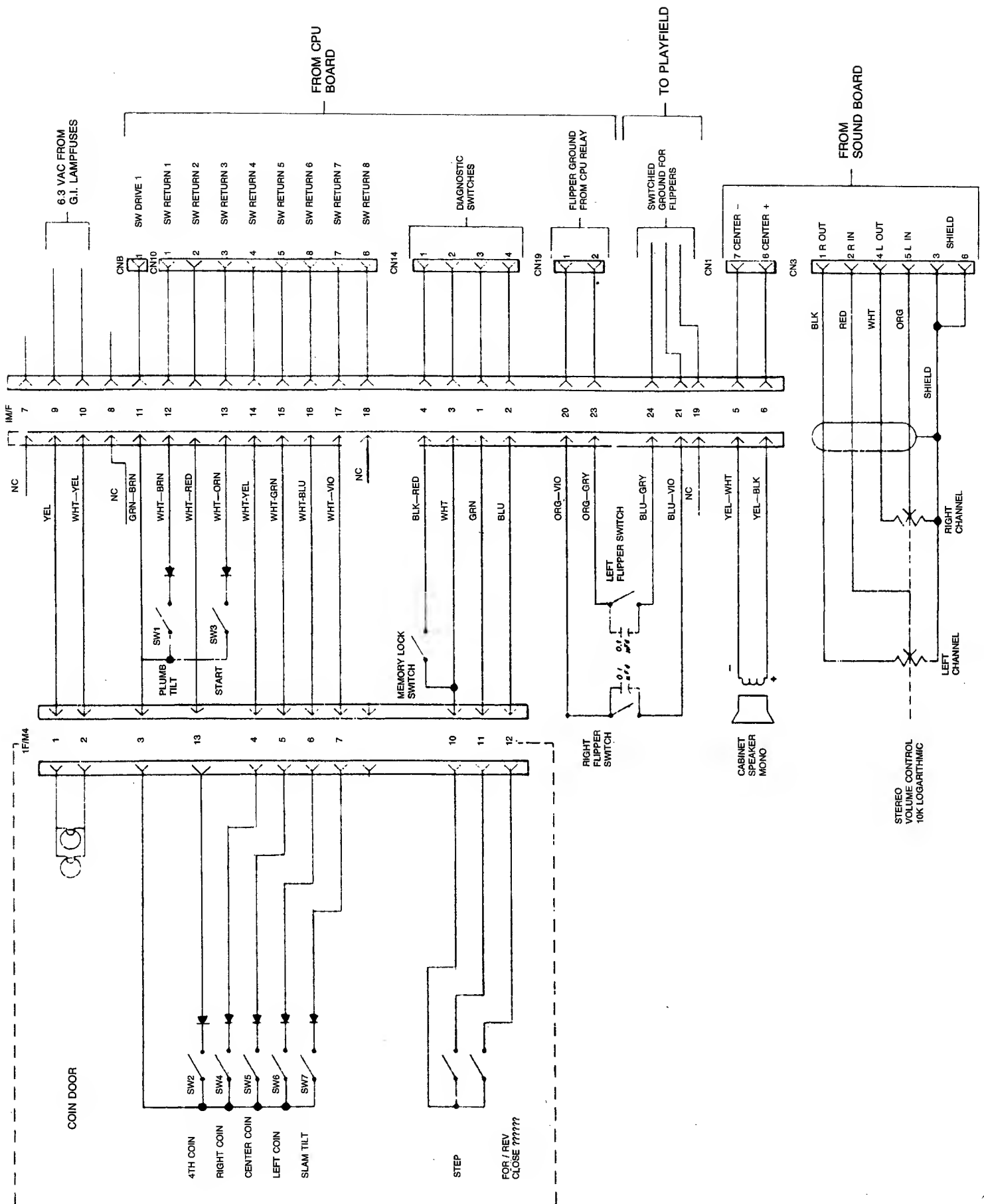
**Ball Launch Ass'y
500-5477-01**

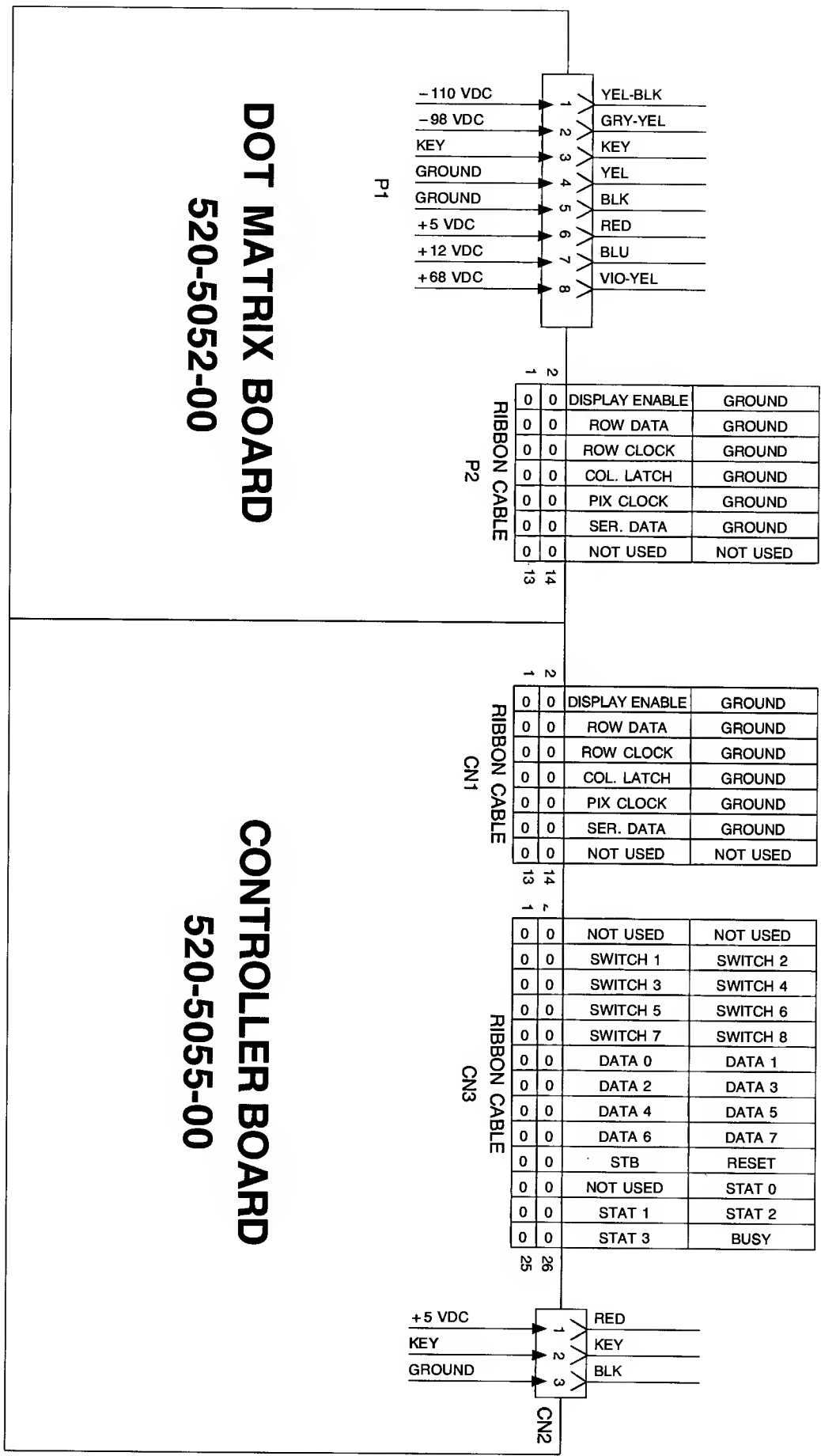


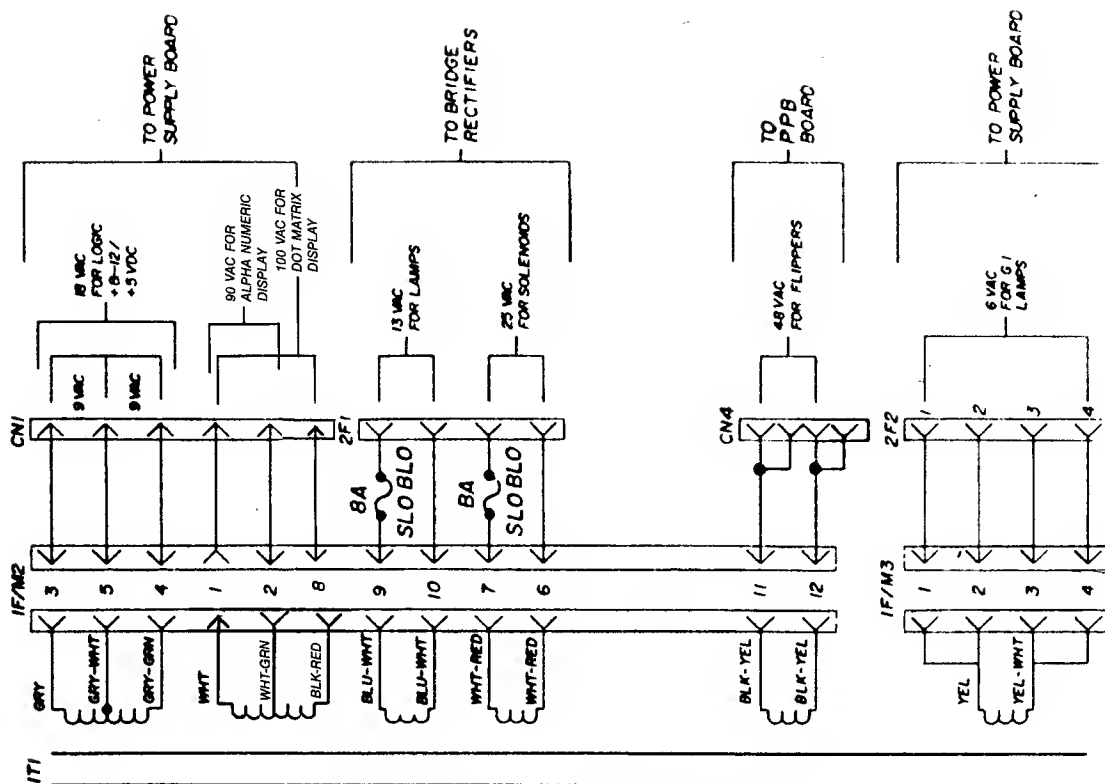
**Ramp Diverter Arm
515-5714-00**



**Playfield Diverter Arm
515-5708-00**

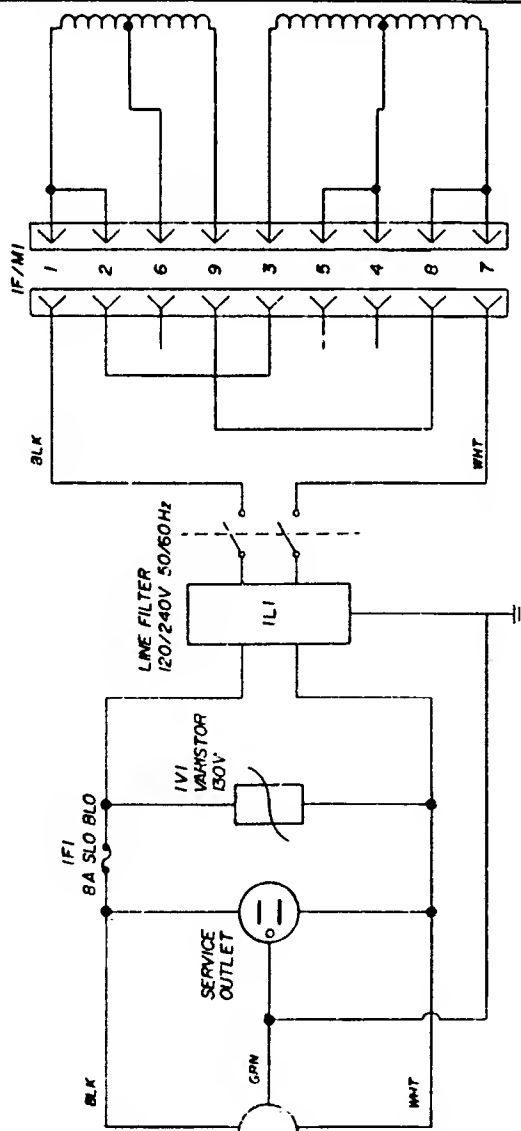






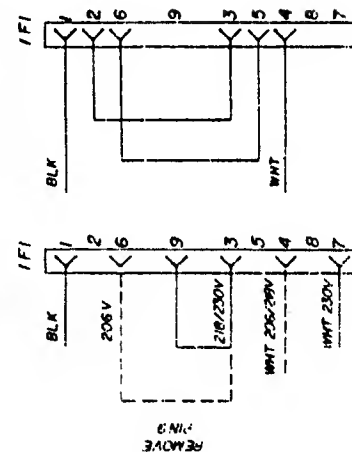
THIS CONFIGURATION FOR 115 V

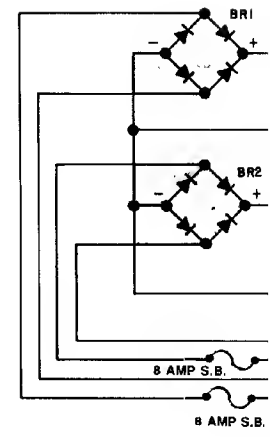
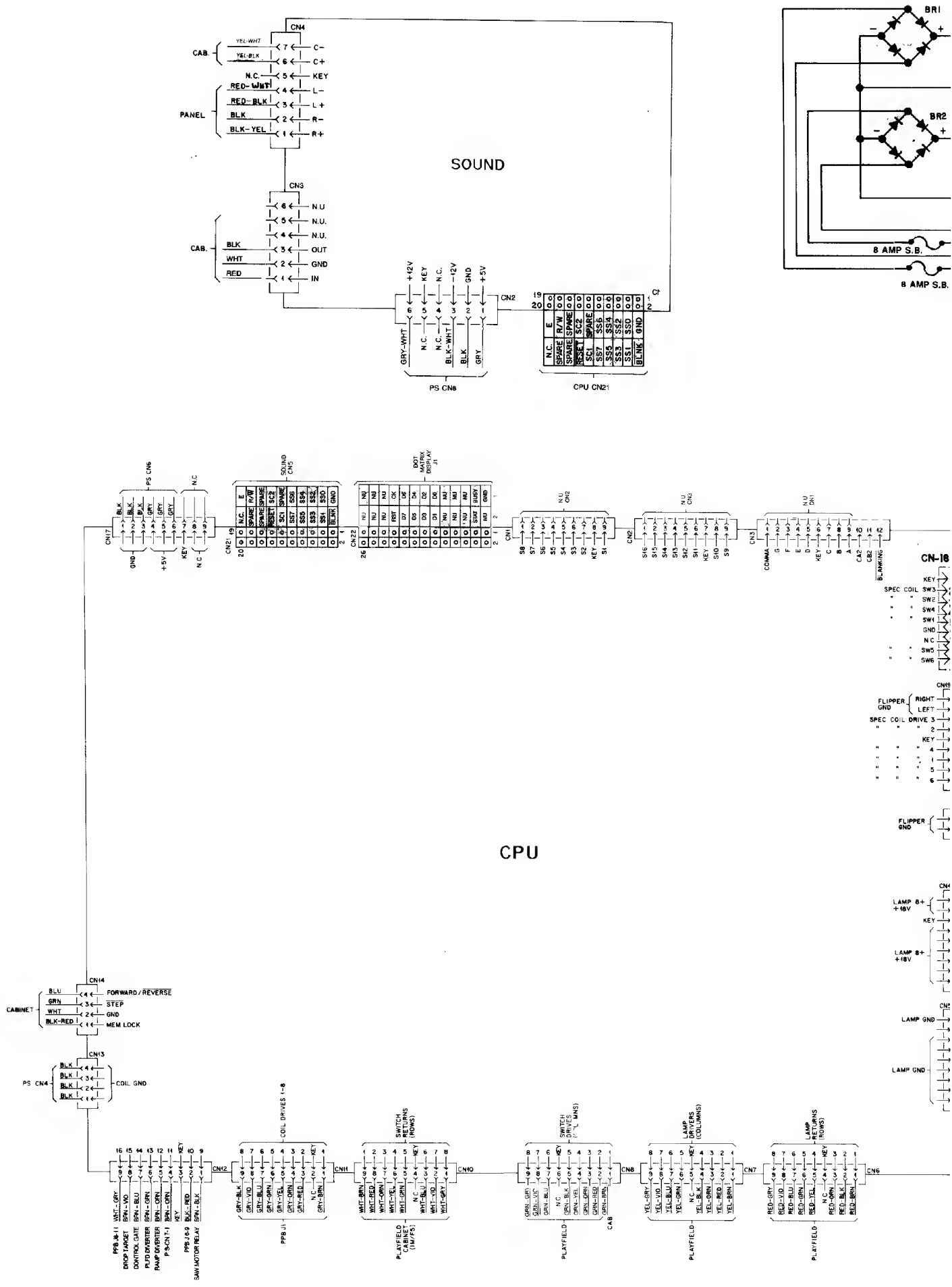
FOR LOWER LINE VOLTAGES
OR 230 VOLT OPERATION
SEE SAMPLES BELOW



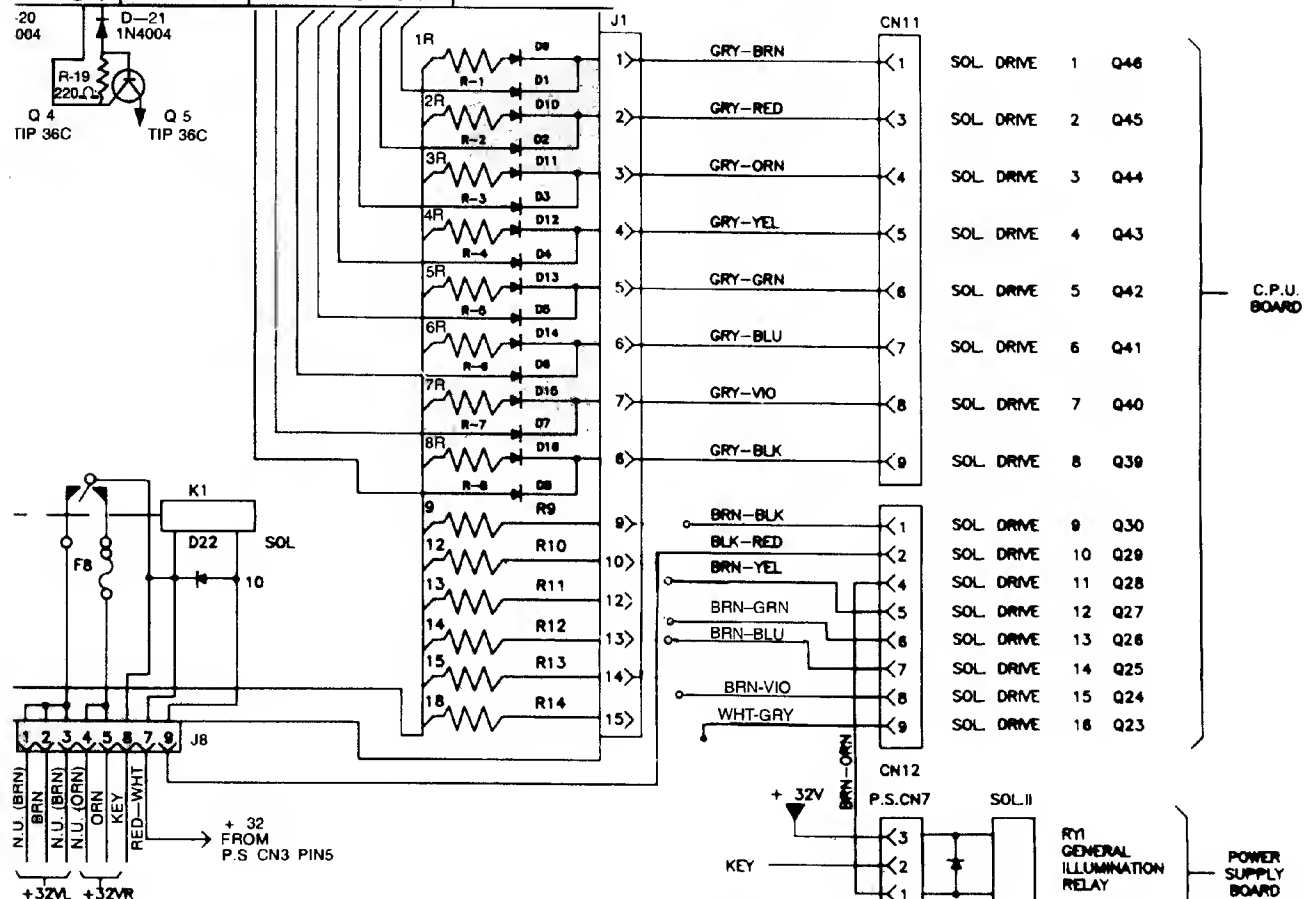
JUMPERS FOR VOLTAGE VARIATION

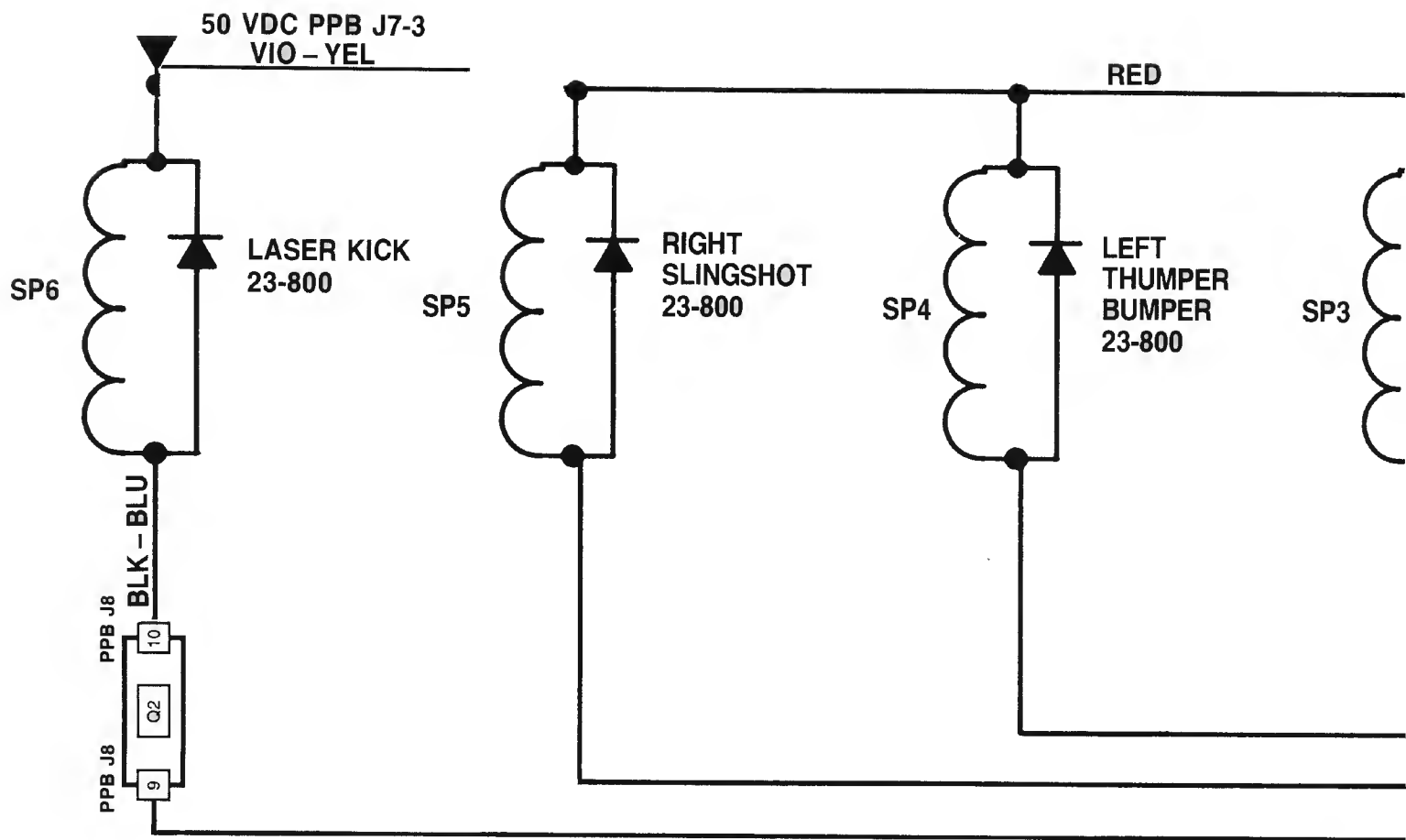
230/218/206 VOLTS	100/105 VOLTS
IF1 = 4A SLO BLO	IF1 = 8A SLO BLO
IV1 = 275V VARISTOR	IV1 = 130V VARISTOR

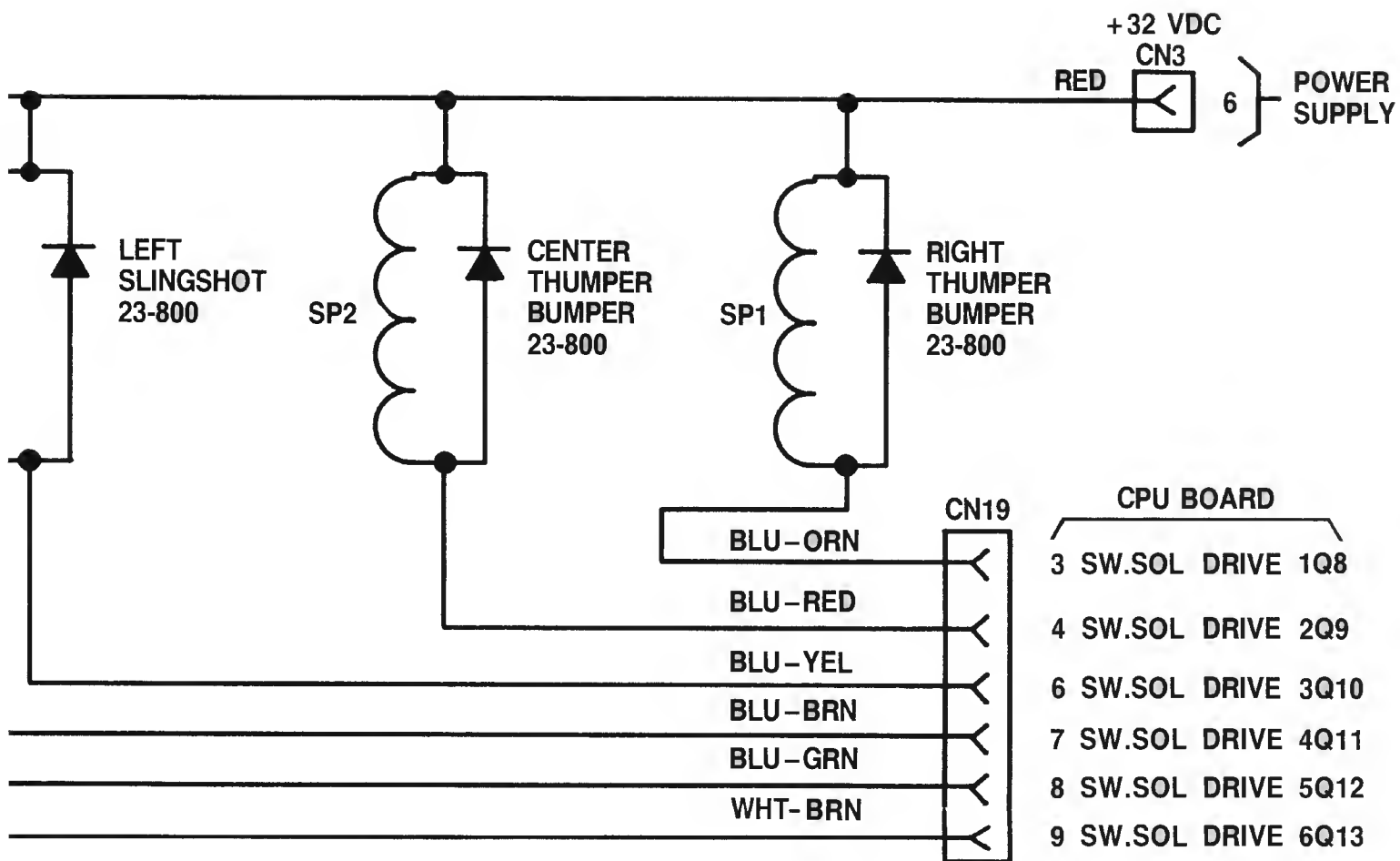




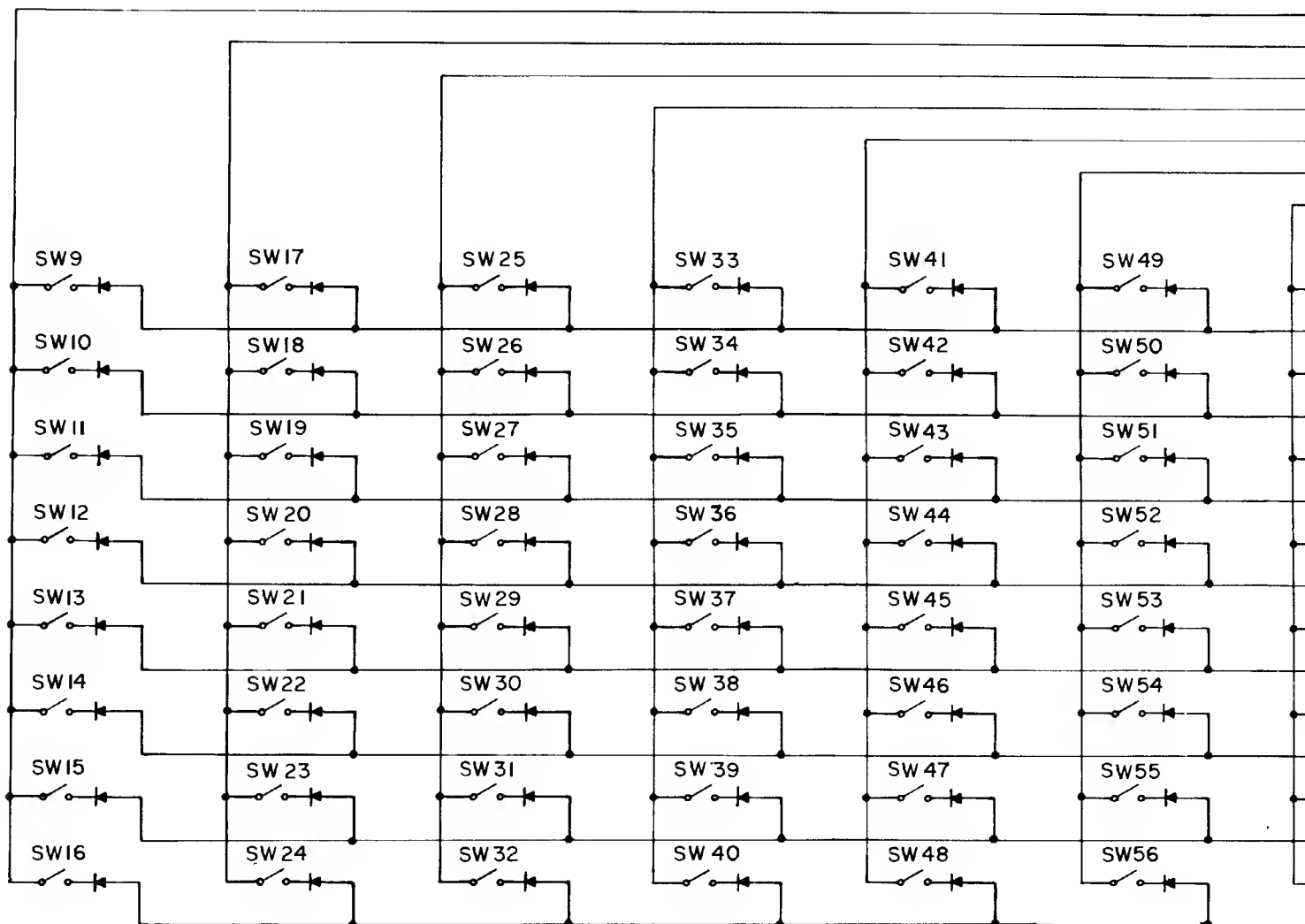






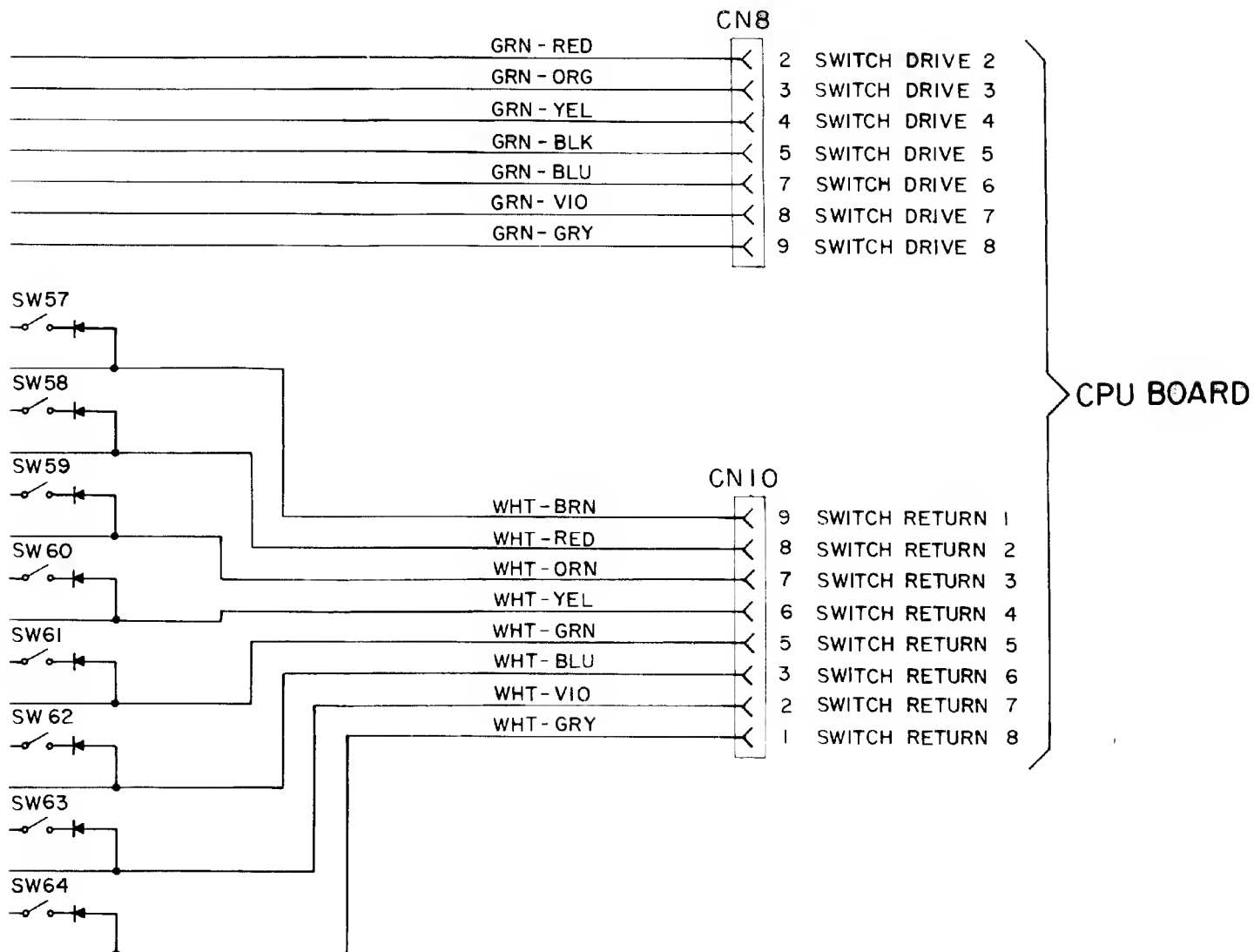


Switch Number	Description	Part No.					
01*	Plumb Tilt	See Cabinet	16*	Right Flip. Cab.	180-5048-01	31	Left
02*	4th Coin	-	17	Drop Target Top	180-5092-01	32	Left
03*	Credit Button	500-5097-02	18	Drop Target Top/Mid	180-5092-01	33	Left
04*	Right Coin	180-5024-00	19	Drop Target Middle	180-5092-01	34	Left
05*	Center Coin	180-5024-00	20	Drop Target Bot/Mid	180-5092-01	35	Right
06*	Left Coin	180-5024-00	21	Drop Target Bottom	180-5092-01	36	Right
07*	Slam Tilt	180-5022-00	22	Hat Target Bottom	500-5640-36	37	Und
08	Not Used	-	23	Hat Target Middle	500-5640-36	38	Right
09*	Launch Button	500-5410-02	24	Hat Target Top	500-5640-36	39	Right
10	Outhole	180-5011-00	25	Small Target "B"	500-5607-05	40	Right
11	Left Trough	180-5009-00	26	Small Target "O"	500-5607-06	41	Left
12	Center Trough	180-5009-00	27	Small Target "M"	500-5607-02	42	Cent
13	Right Trough	180-5010-00	28	Small Target "B"	500-5607-04	43	Right
14	Shooter Lane	180-5100-01	29	Super VUK	180-5064-00	44	Left
15*	Left Flip. Cab	180-5048-01	30	Left Slingshot	180-5054-00	45	Cent



Return Lane	500-5142-00	46	Right Turbo Bumper	180-5015-00
Outlane	500-5142-00	47	Left Ramp Enter	500-5382-00
Orbit Bottom	180-5090-00	48	Left Ramp Exit	500-5633-00
Orbit Top	500-5142-00	49	Right Ramp Enter	500-5382-00
it Orbit Top	500-5142-00	50	Right Ramp Exit	500-5633-00
it Orbit Bottom	500-5142-00	51	Not Used	-
er Trough	500-5633-00	52	VUK	180-5063-00
it Slingshot	180-5054-00	53	Not Used Through 64	-
it Return Lane	500-5142-00			
it Outlane	500-5142-00			
Top Lane	500-5142-00			
ter Top Lane	500-5142-00			
it Top Lane	500-5142-00			
Turbo Bumper	180-5015-00			
ter Turbo Bumper	180-5015-00			

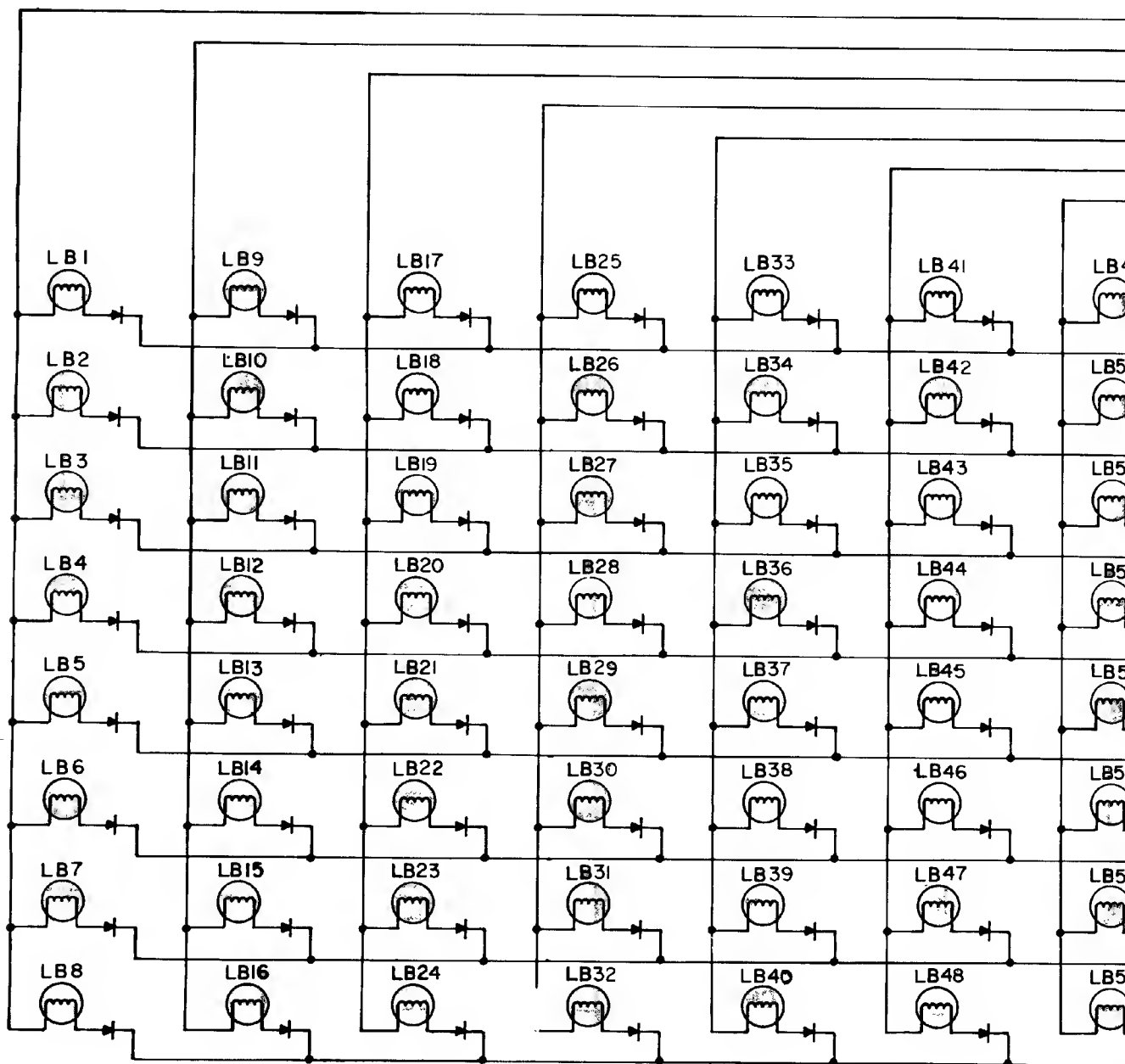
*Indicates Cabinet Switches.



Lamp Number	Description
01	Top Blue
02	Middle Blue
03	Bottom Blue
04	Top Yellow
05	Middle Yellow
06	Bottom Yellow
07	Bottom Red
08	Middle Red
09	Top Red
10	Bottom Green
11	Middle Green
12	Top Green
13	Pie TRI-BALL
14	Spin & Win
15	Credit Button
16	Left Ramp Entrance

17	Drop Target 1	33
18	Drop Target 2	34
19	Drop Target 3	35
20	Drop Target 4	36
21	Drop Target 5	37
22	Left Return Lane	38
23	Right Return Lane	39
24	Right Outlane	40
25	BOMB Light	41
26	BOMB Light	42
27	BOMB Light	43
28	BOMB Light	44
29	Laser Kick 1 Mil	45
30	Laser Kick 3 Mil	46
31	Laser Kick 5 Mil	47
32	Advance X	48

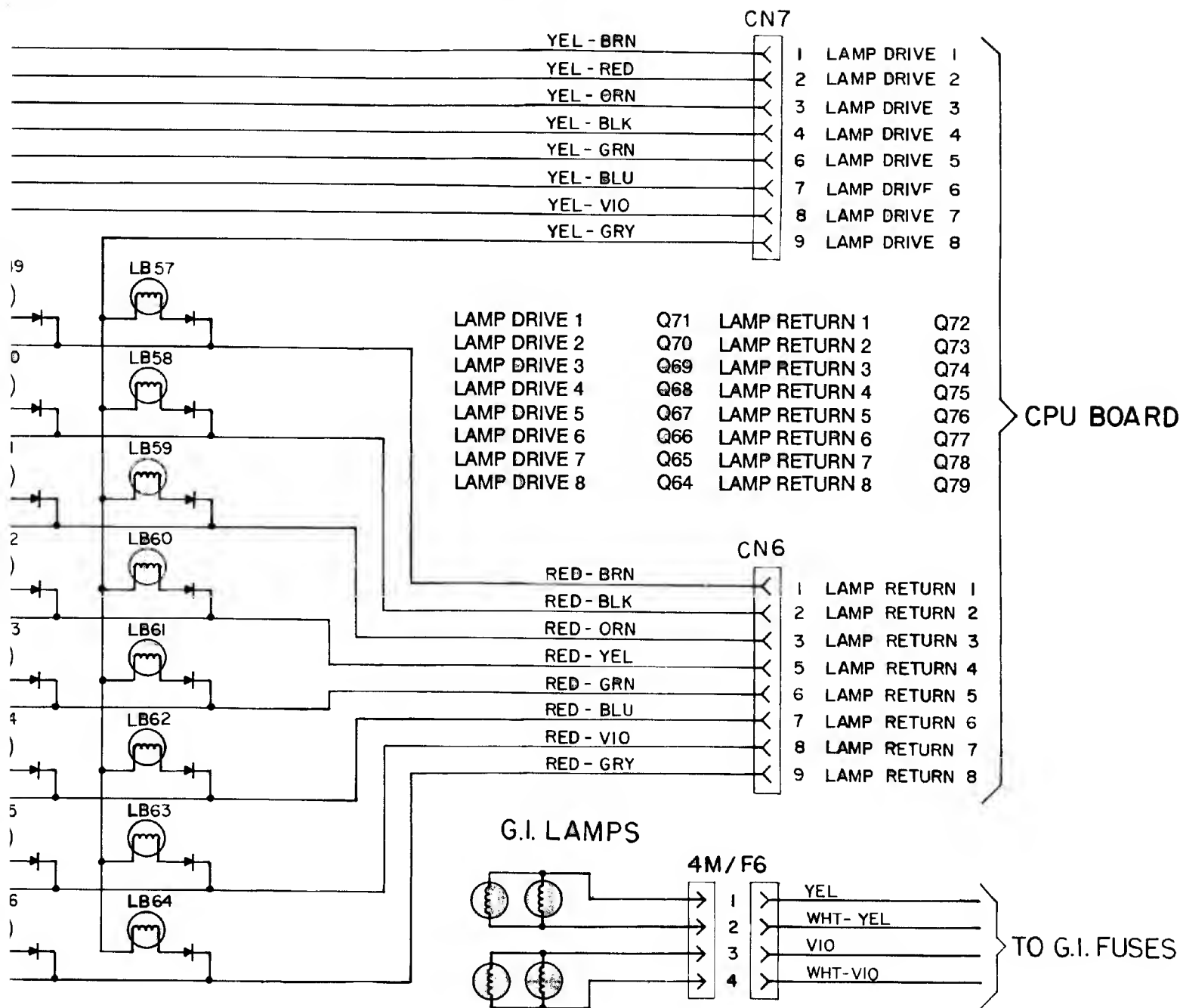
*Indicates Speaker or Backbox I

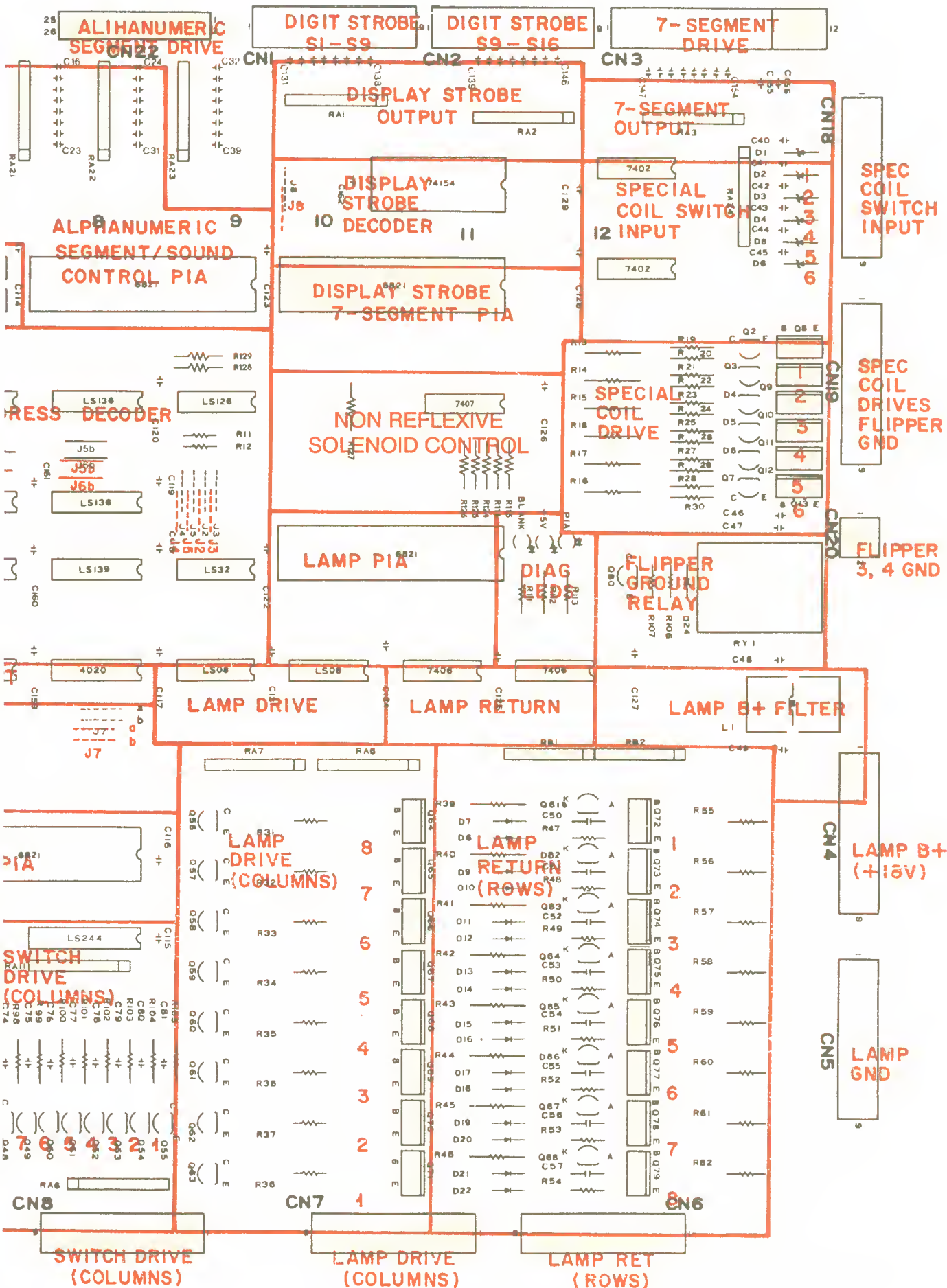


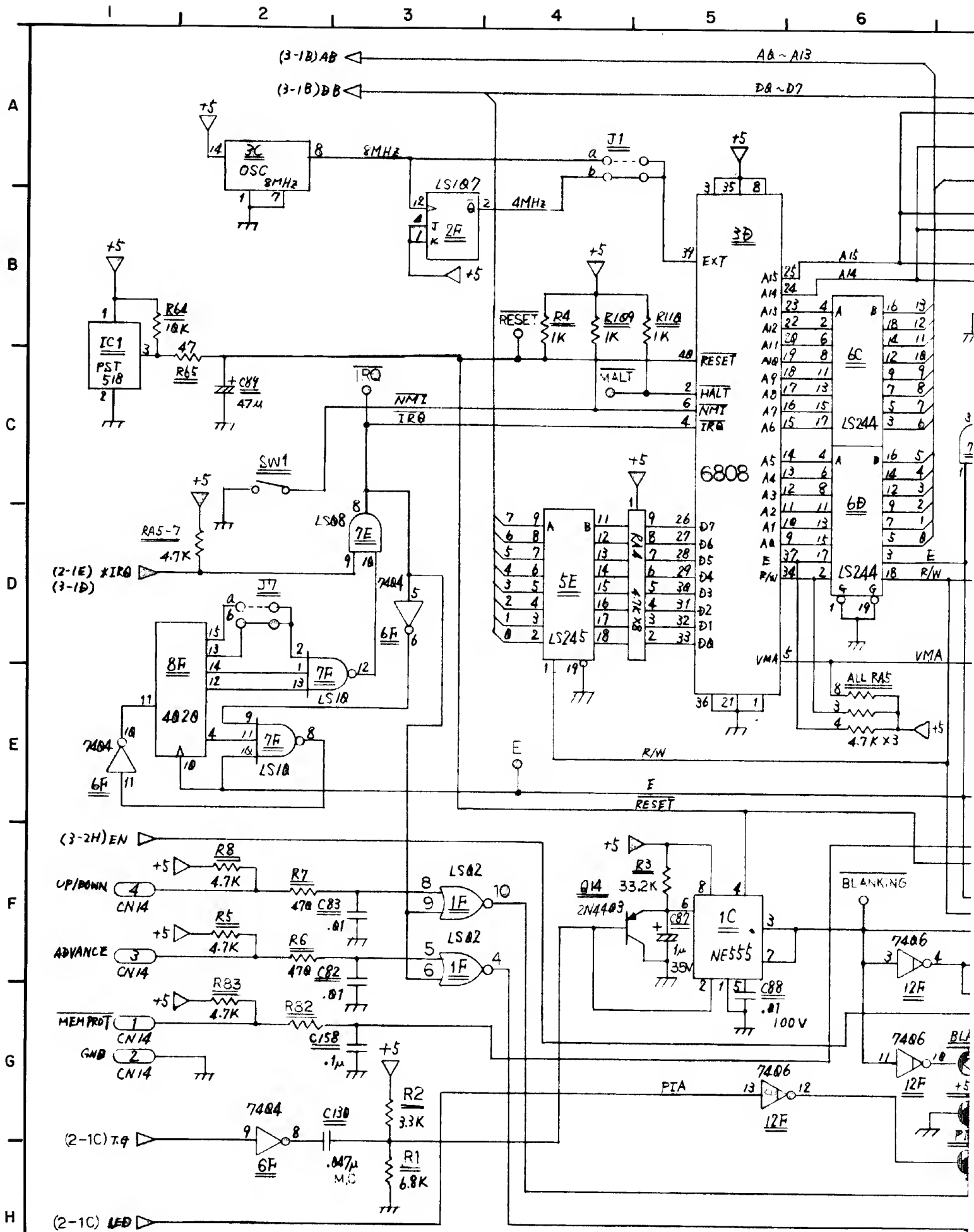
WABAC ???
 Looping
 Instant TRI-BALL
 10 Million
 Lite Mystery Select
 Loose Moose
 Bomb Millions
 Super Pops
 Daisy SELECT
 Daisy SELECT
 Daisy SELECT
 Daisy SELECT
 Daisy SELECT
 Daisy SELECT
 Extra Ball
 Launch Button

49 Left Top Lane
 50 Center Top Lane
 51 Right Top Lane
 52 TRI-BALL
 53 Right Ramp Entrance
 54 Jackpot
 55 Lite WABAC
 56 Mystery Select
 57 Top Hat Target
 58 Middle Hat Target
 59 Bottom Hat Target
 60 Hat Trick
 61 Rhino Bonus
 62 Lite Laser Kick
 63 Special
 64 Shoot Again

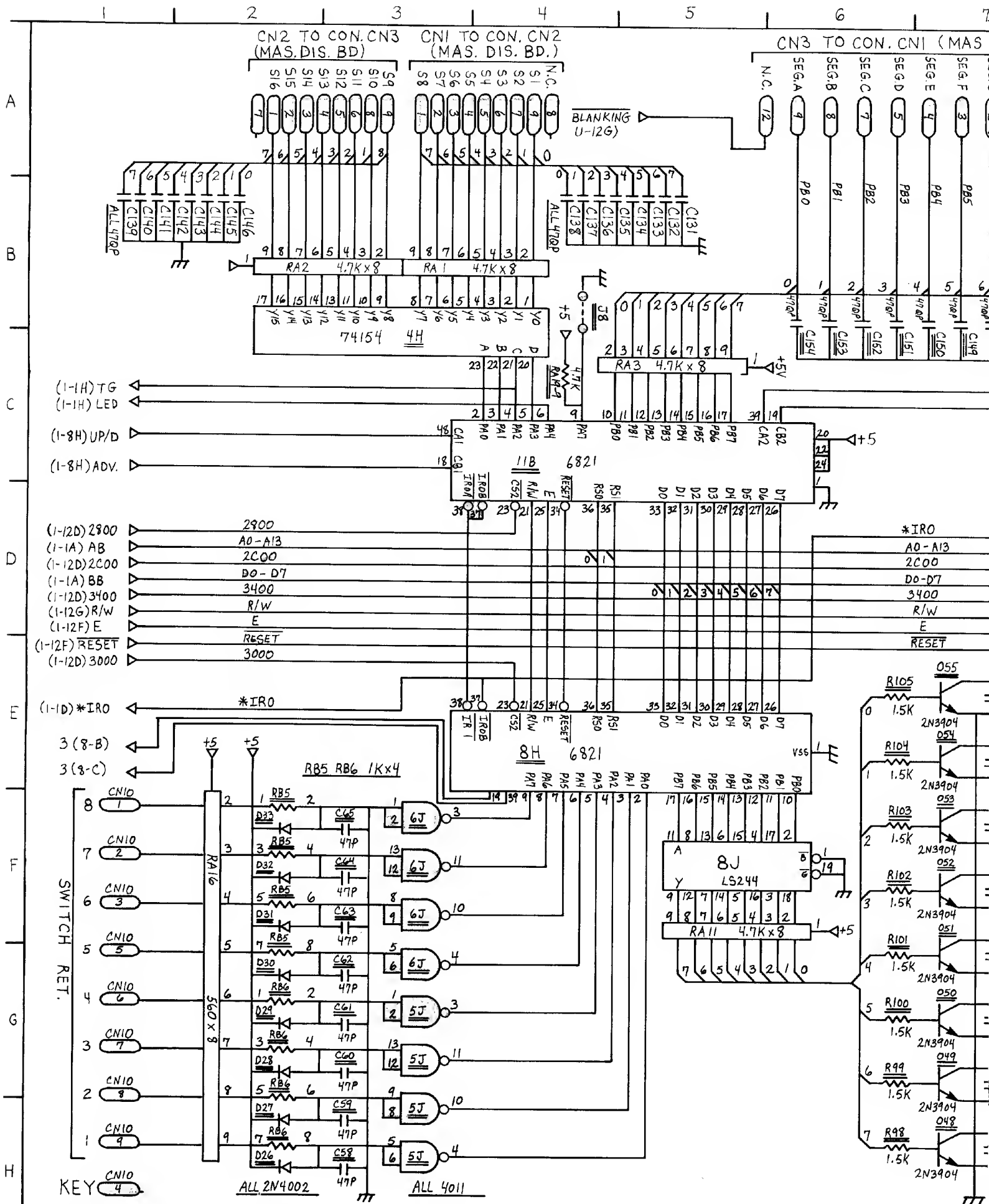
.amp











52 CPU Board Logic Diagram (Sheet 2 of 4)

8

9

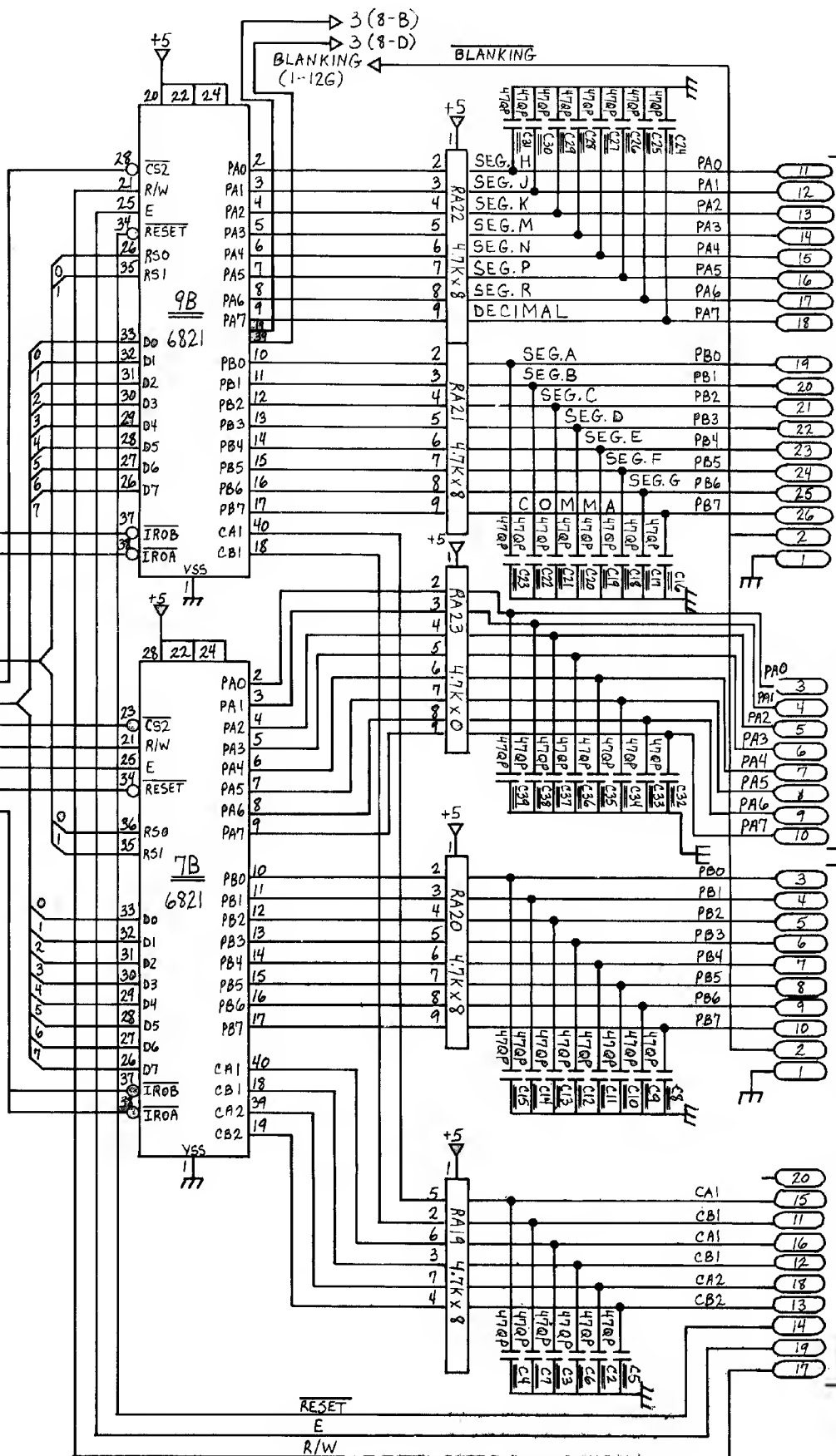
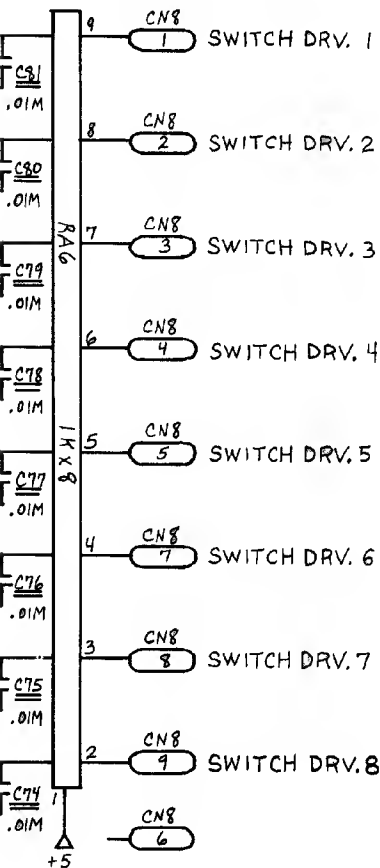
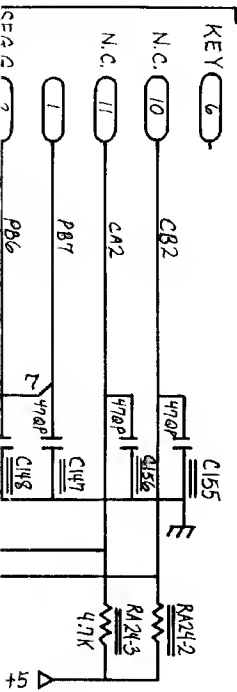
10

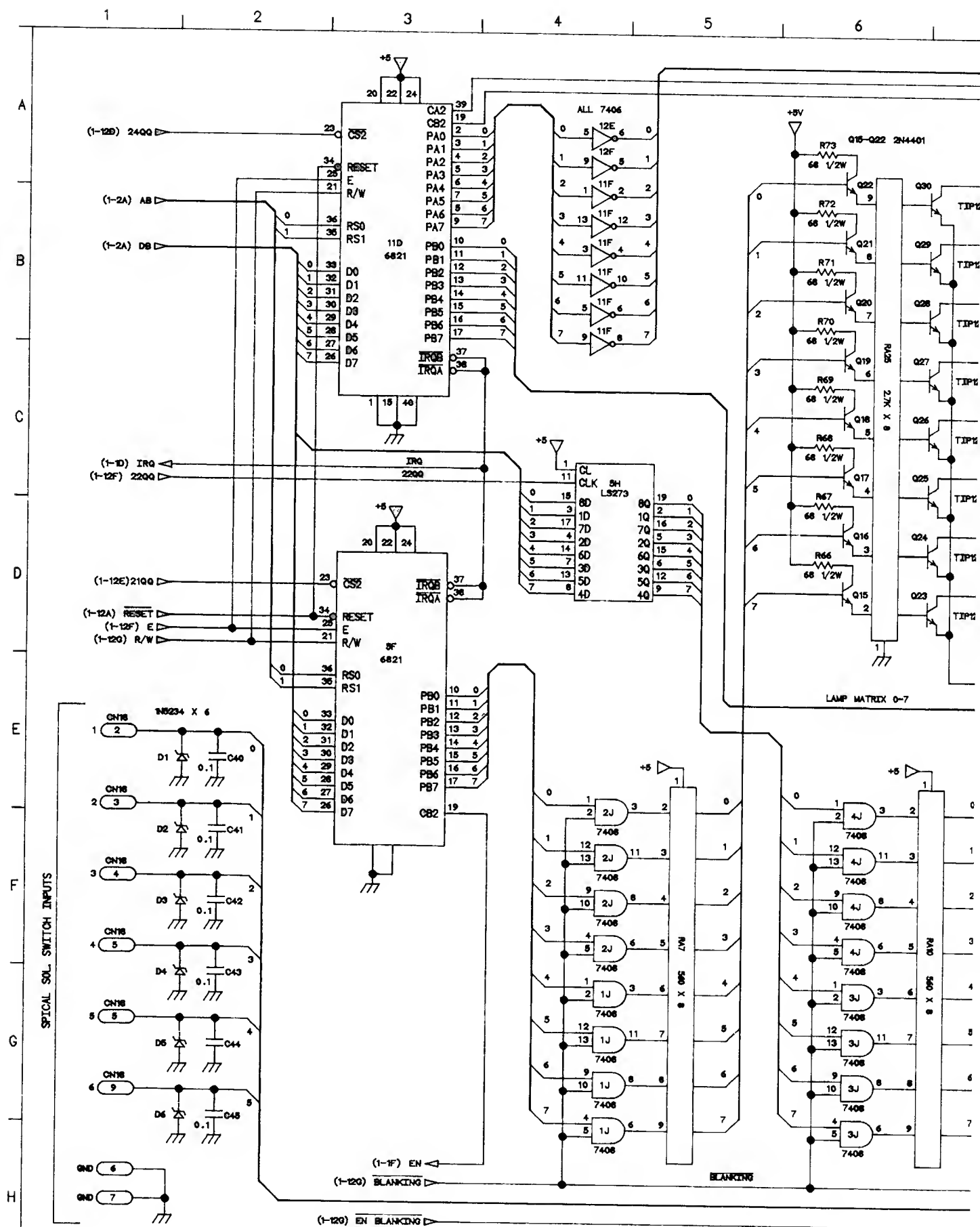
11

12

13

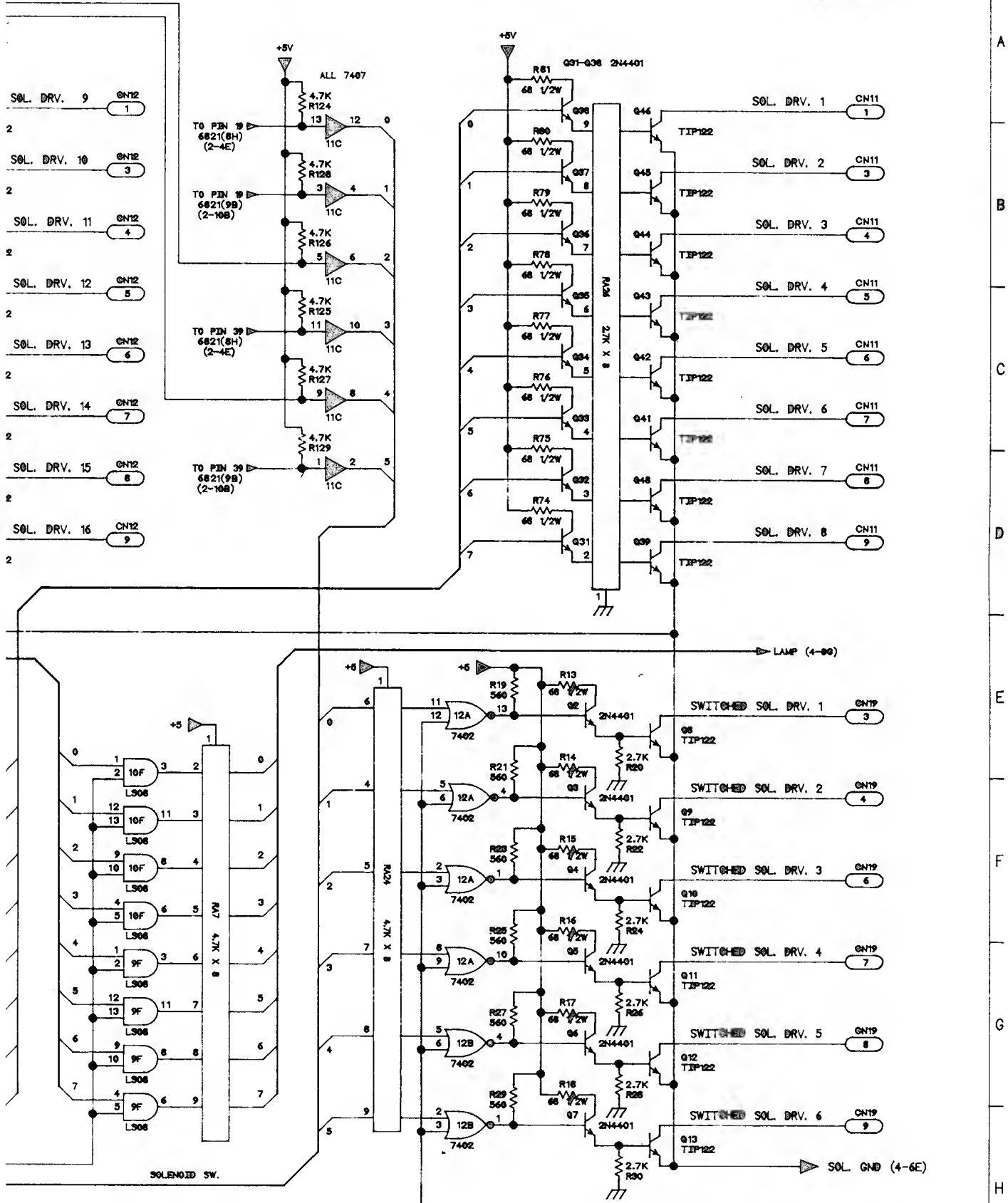
DIS. BD)





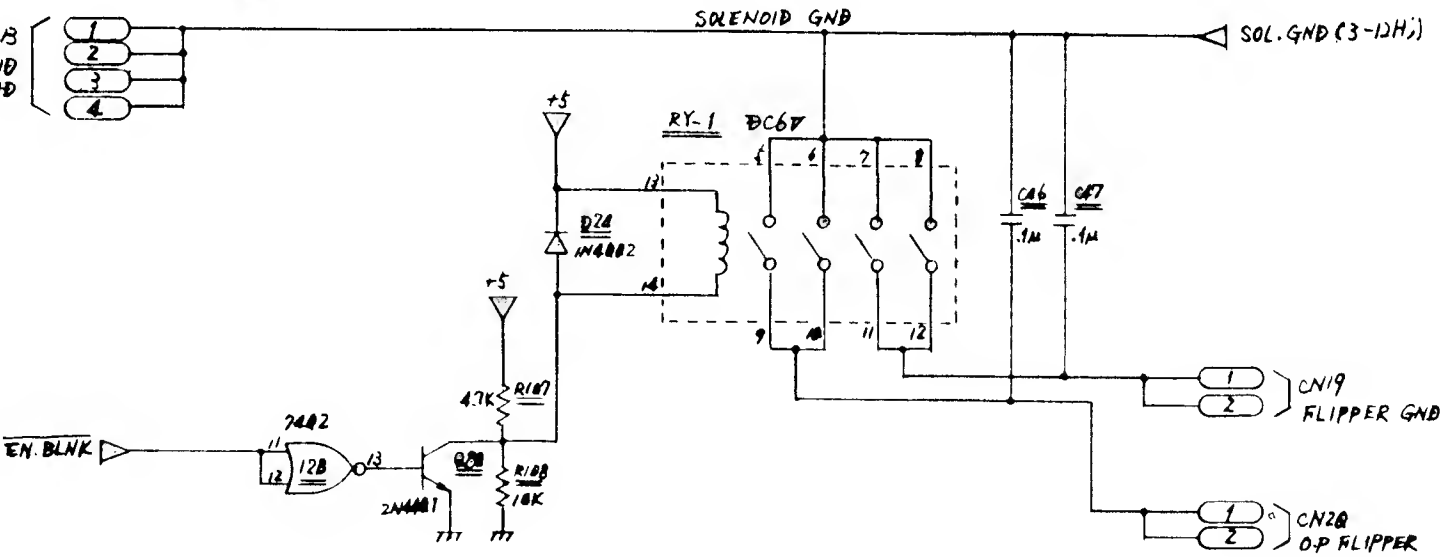
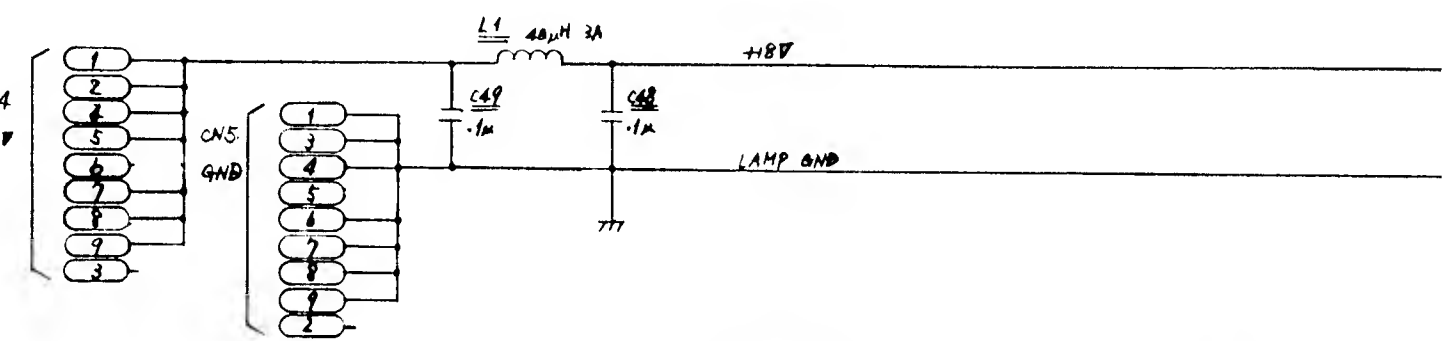
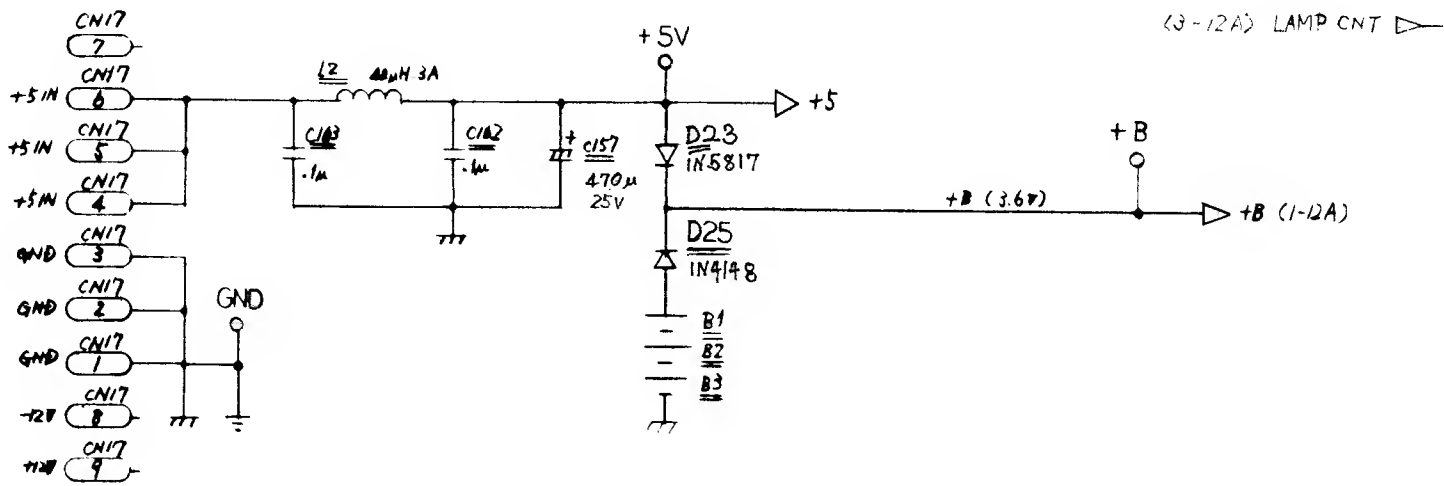
LAMP MATRIX CONT. 0-7

LAMP CNT (4-8A)

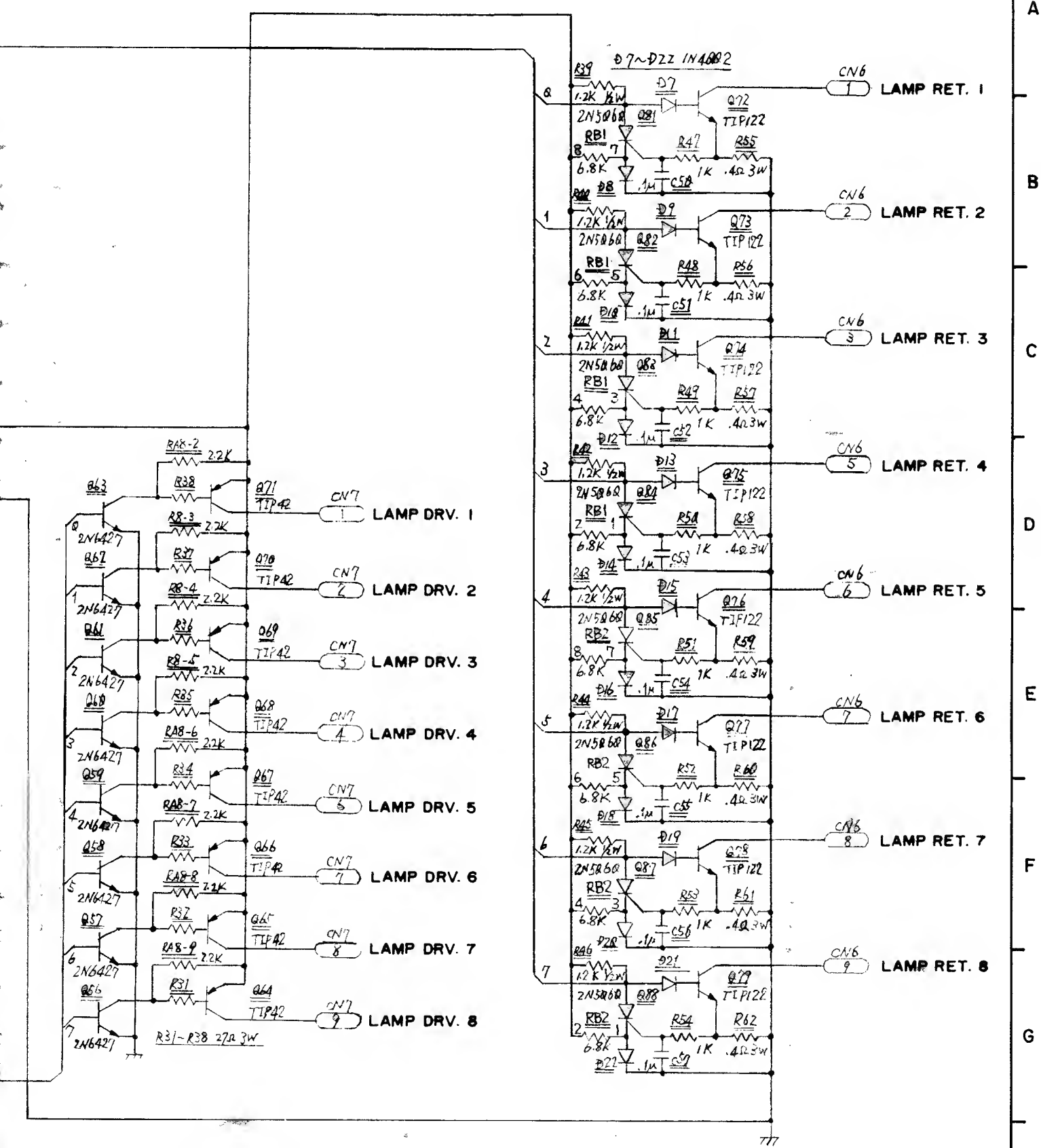


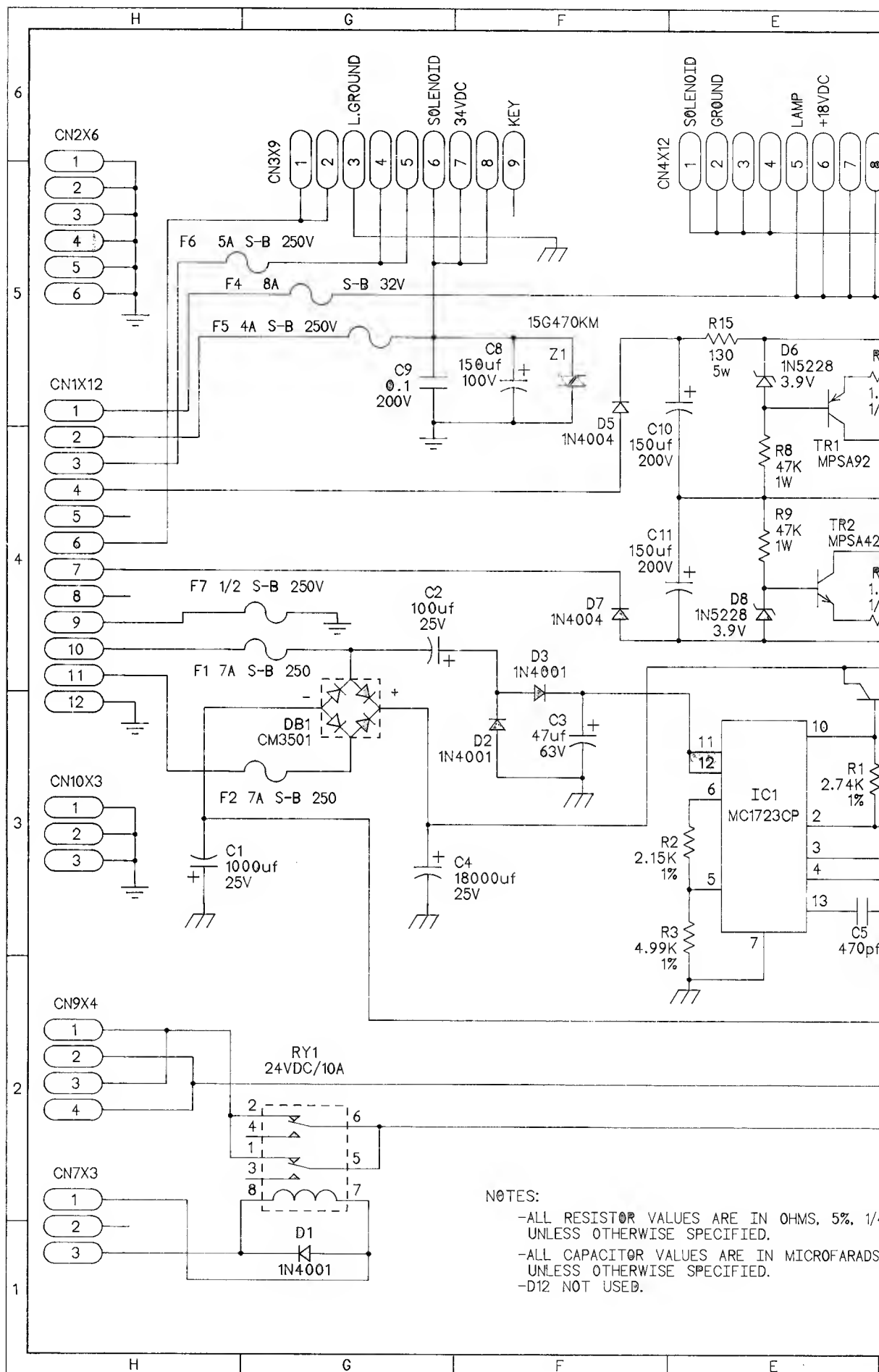
CPU BOARD 3 OF 4 REV.B

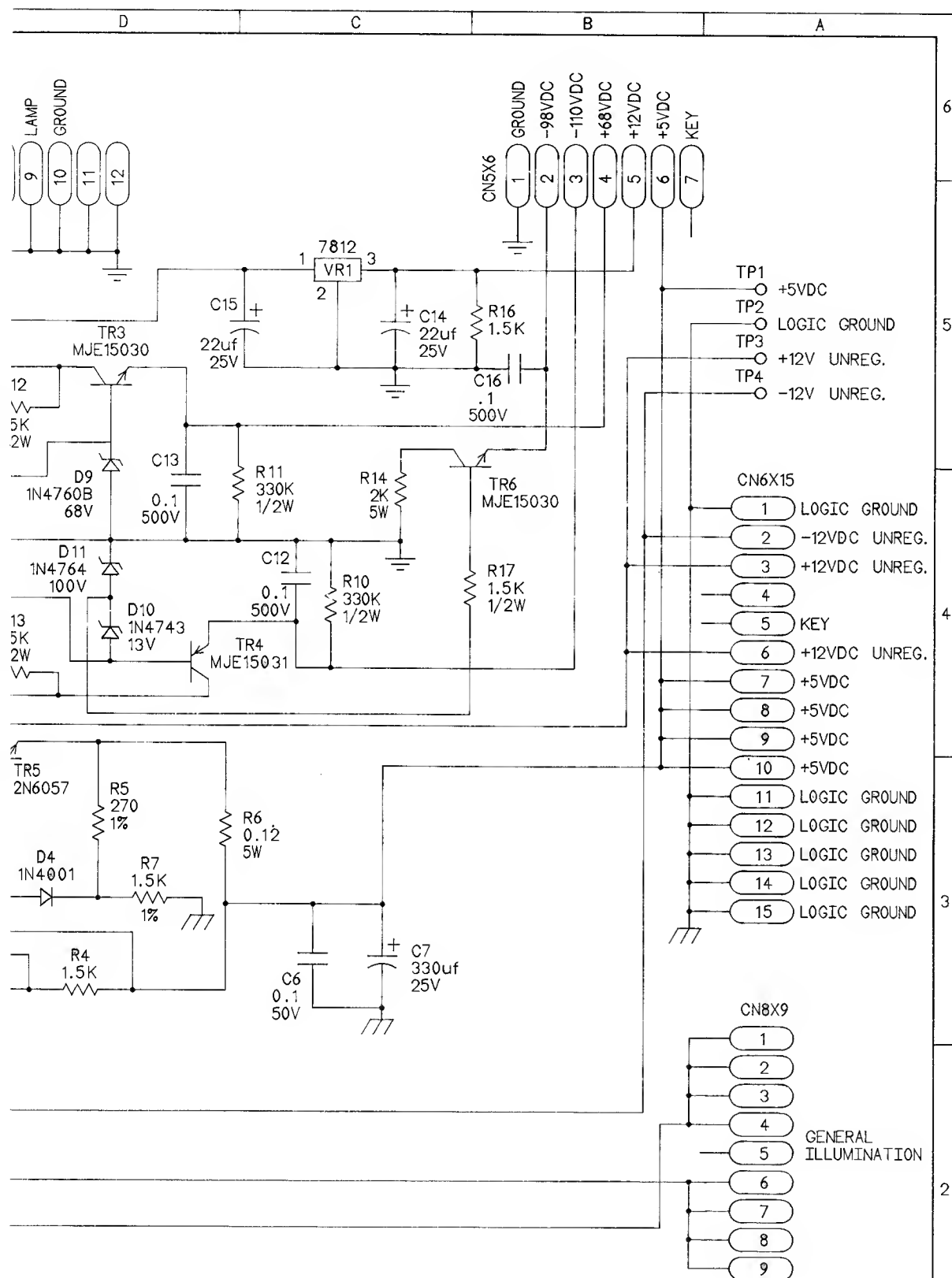
1 2 3 4 5 6



(3-12E) LAMP







DATA EAST PINBALL

POWER SUPPLY BOARD SCHEMATIC

PREPARED BY:

CES INC.

DWG

C

SIZE

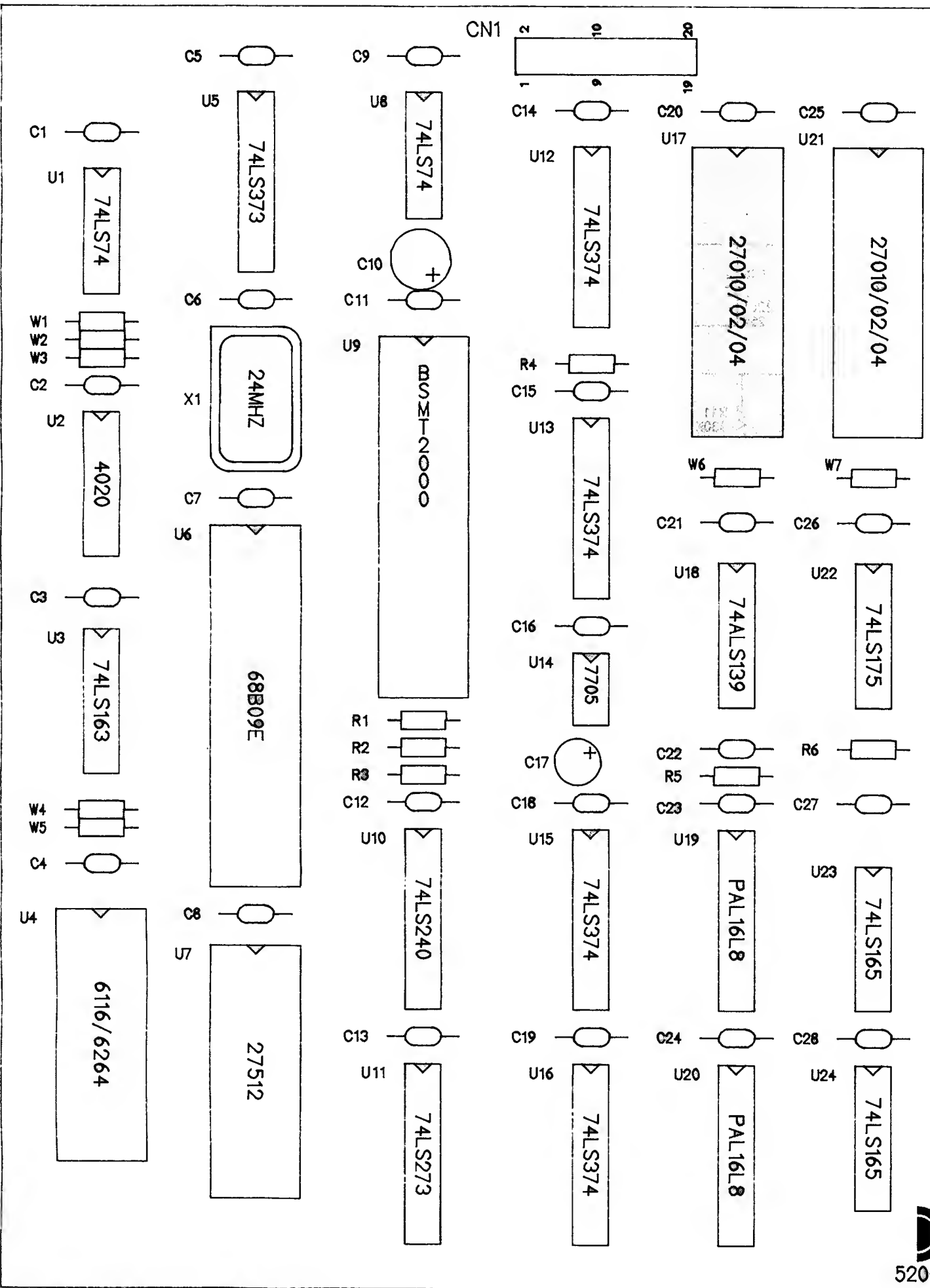
PART NO. 520-5047-01

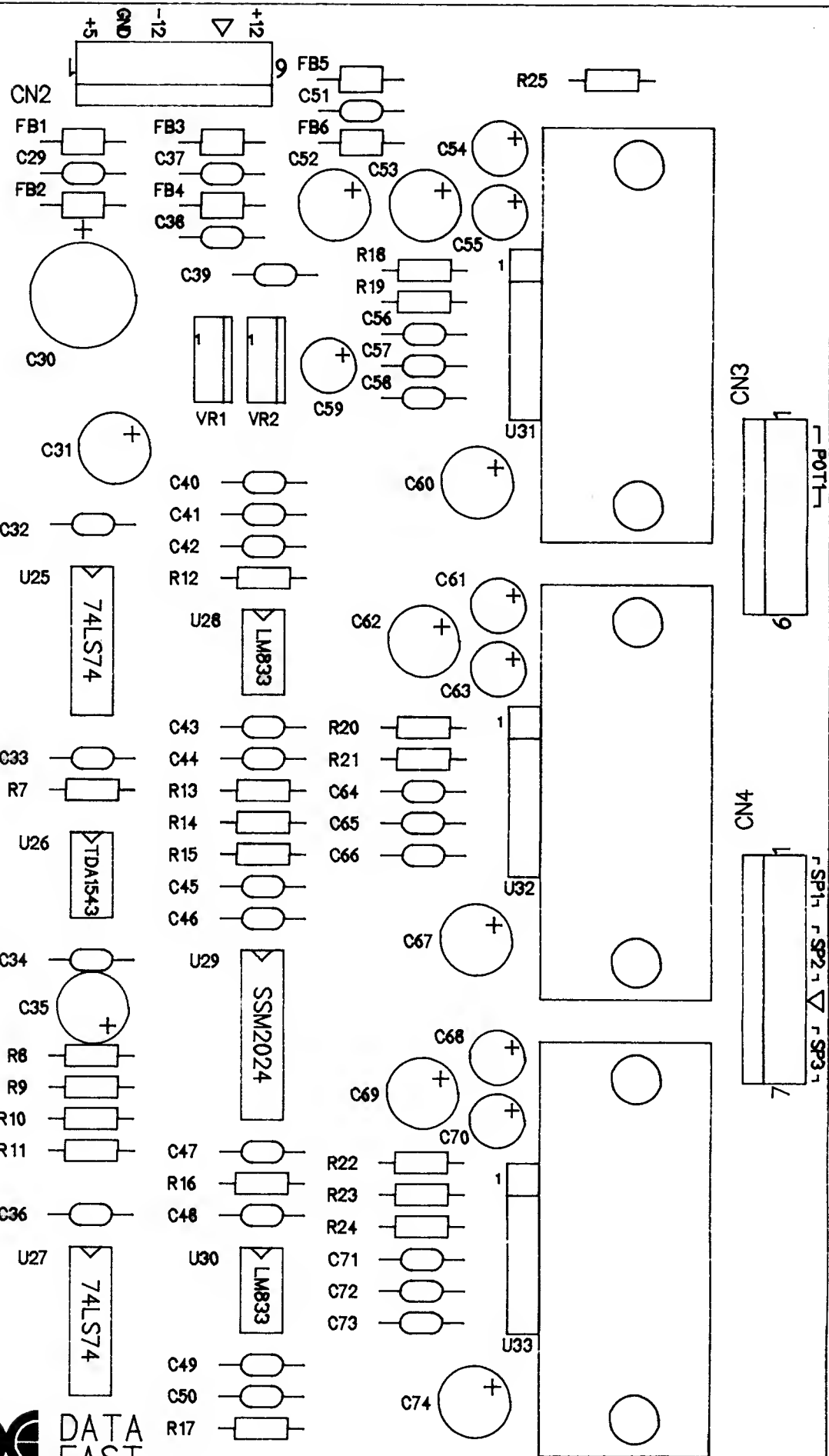
SHEET 1 OF 1

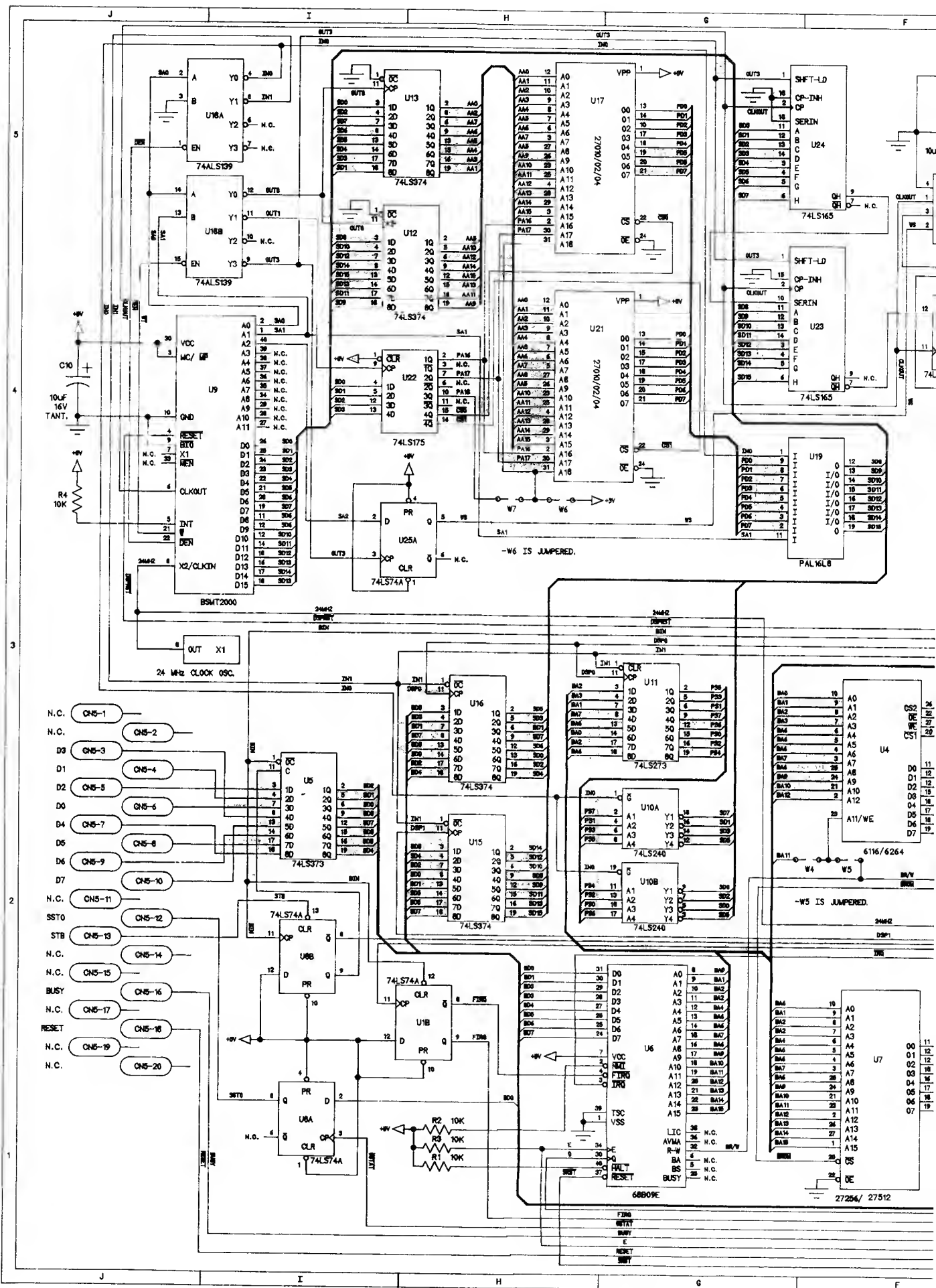
MODEL

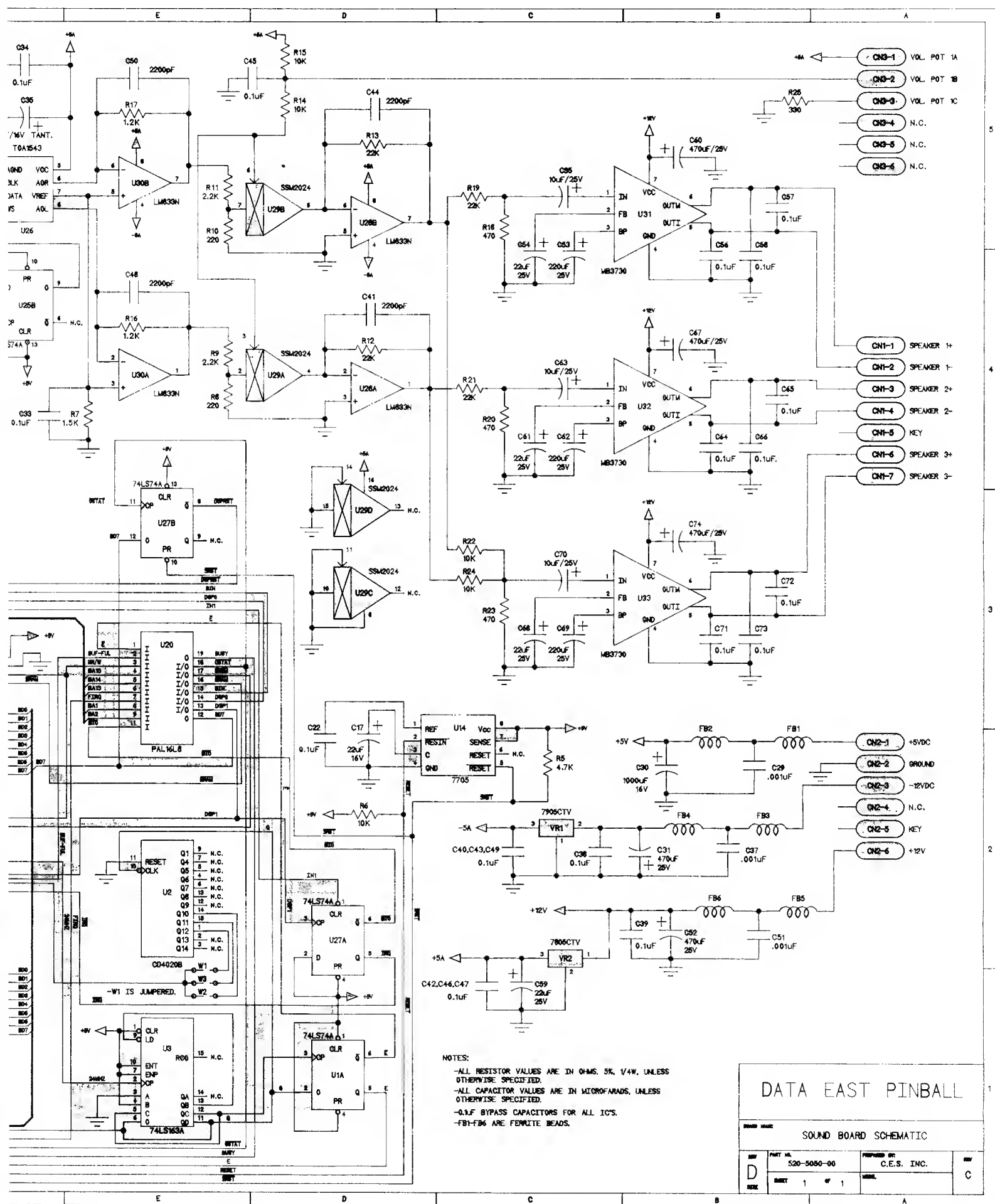
REV

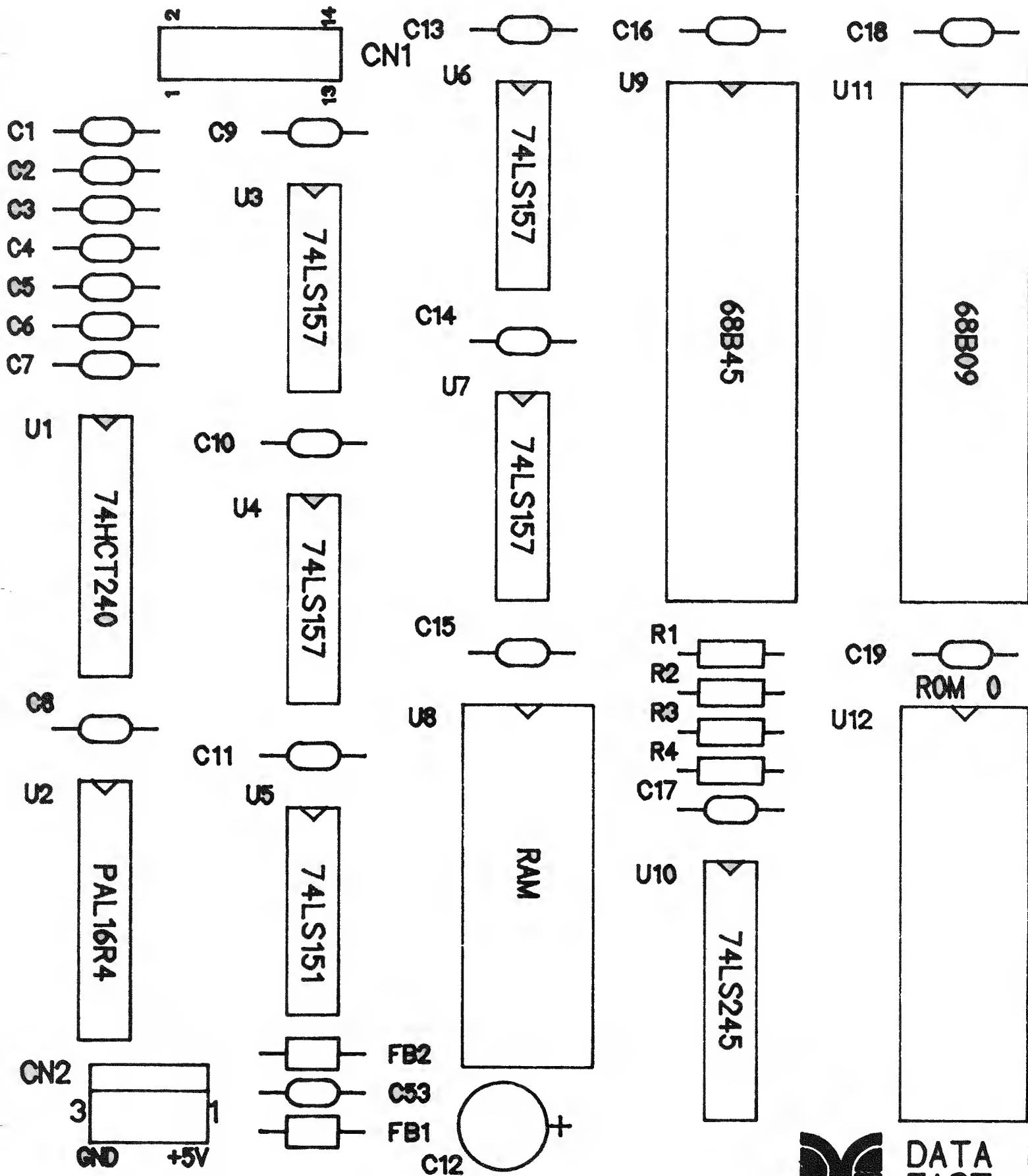
B

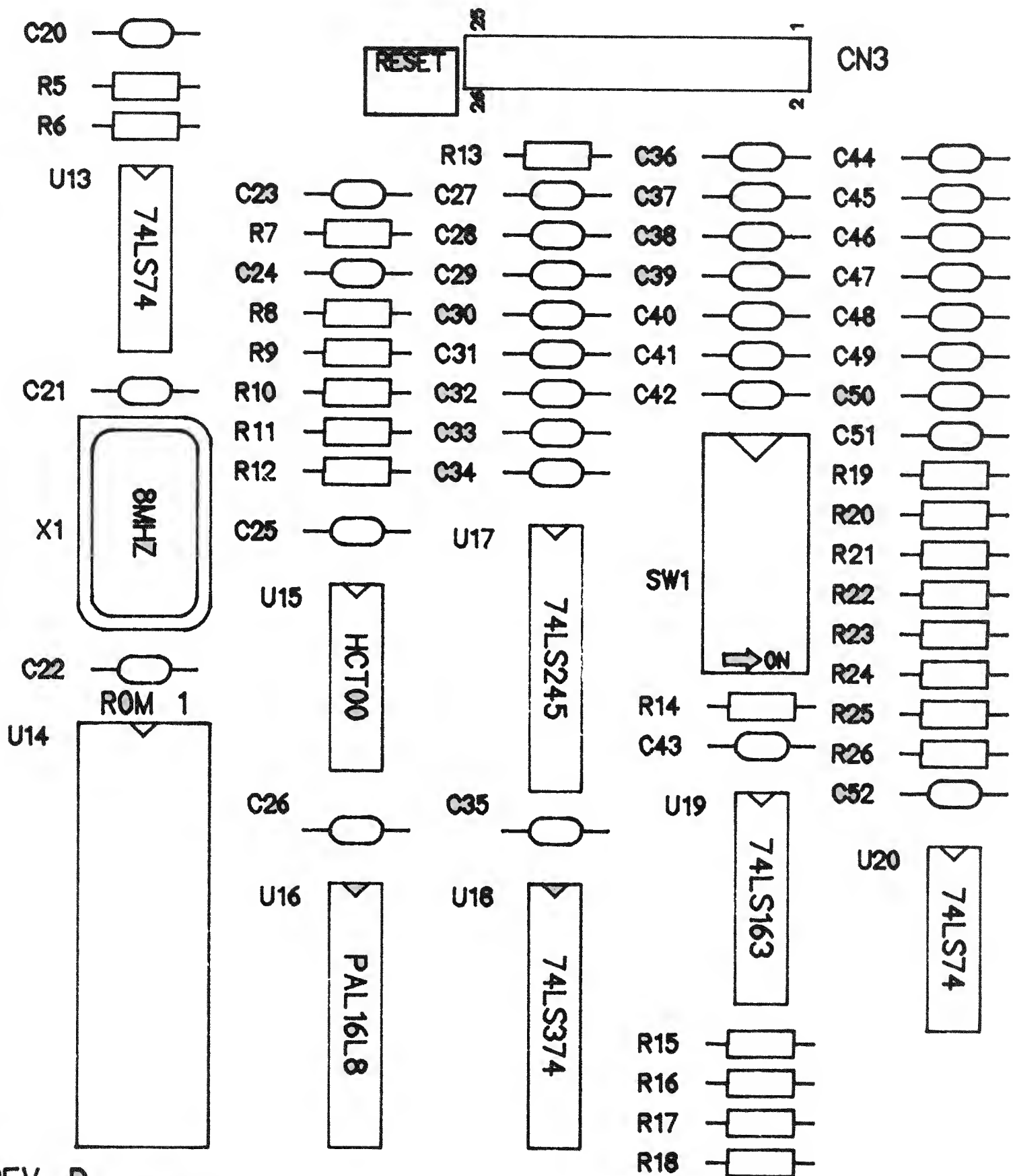






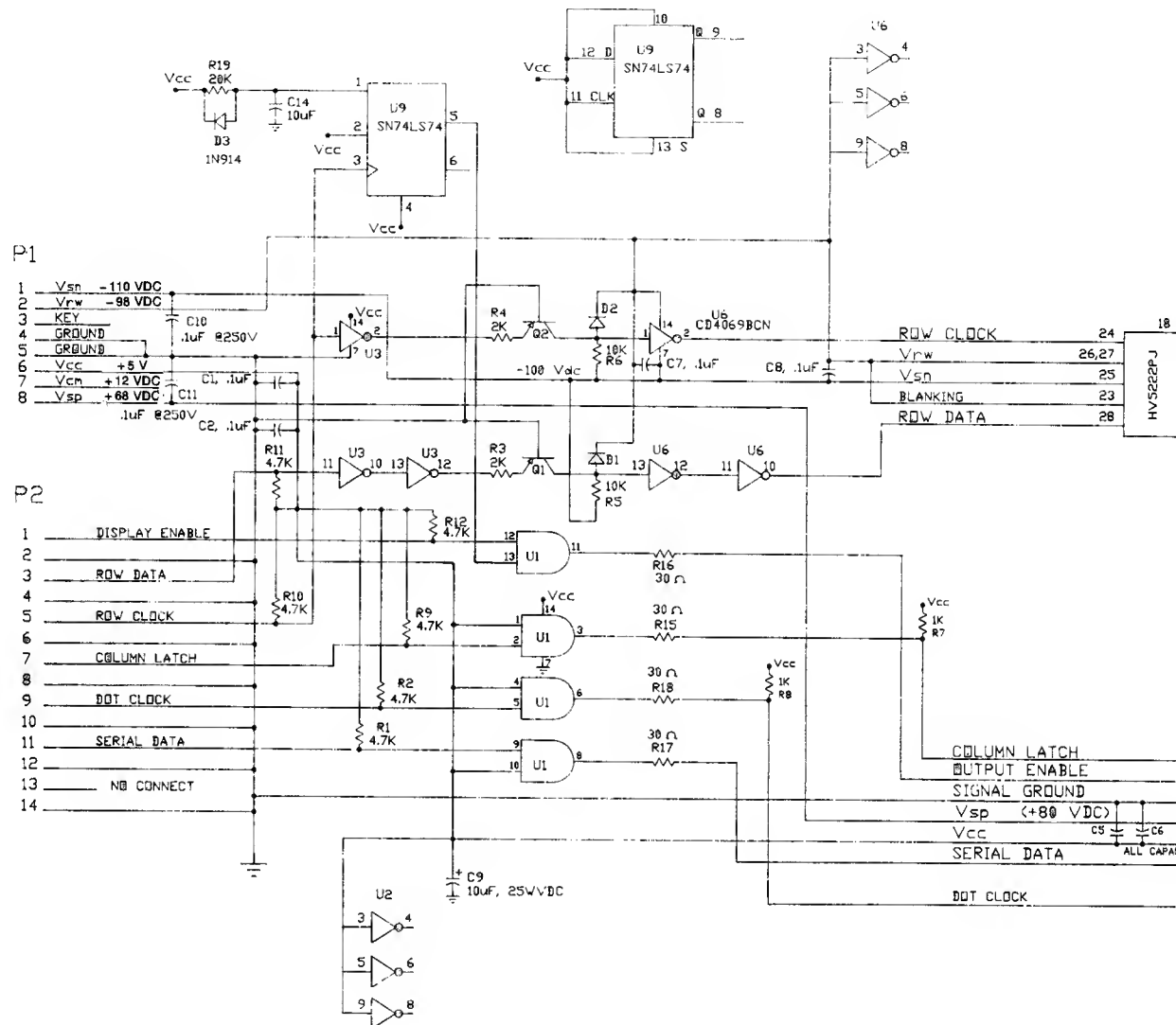






REV.-D
520-5055-00

PART NO.	INTL CODE
281103-01	S



NOTES

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVED

D

C

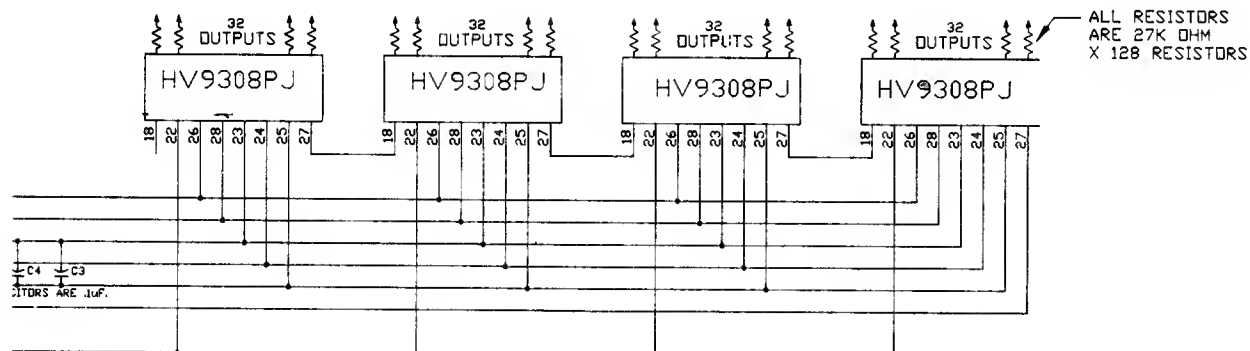


CATHODE CONNECTIONS

DALE PLASMA DISPLAY
PD-128G032

ANODE CONNECTIONS

ANODE CONNECTIONS

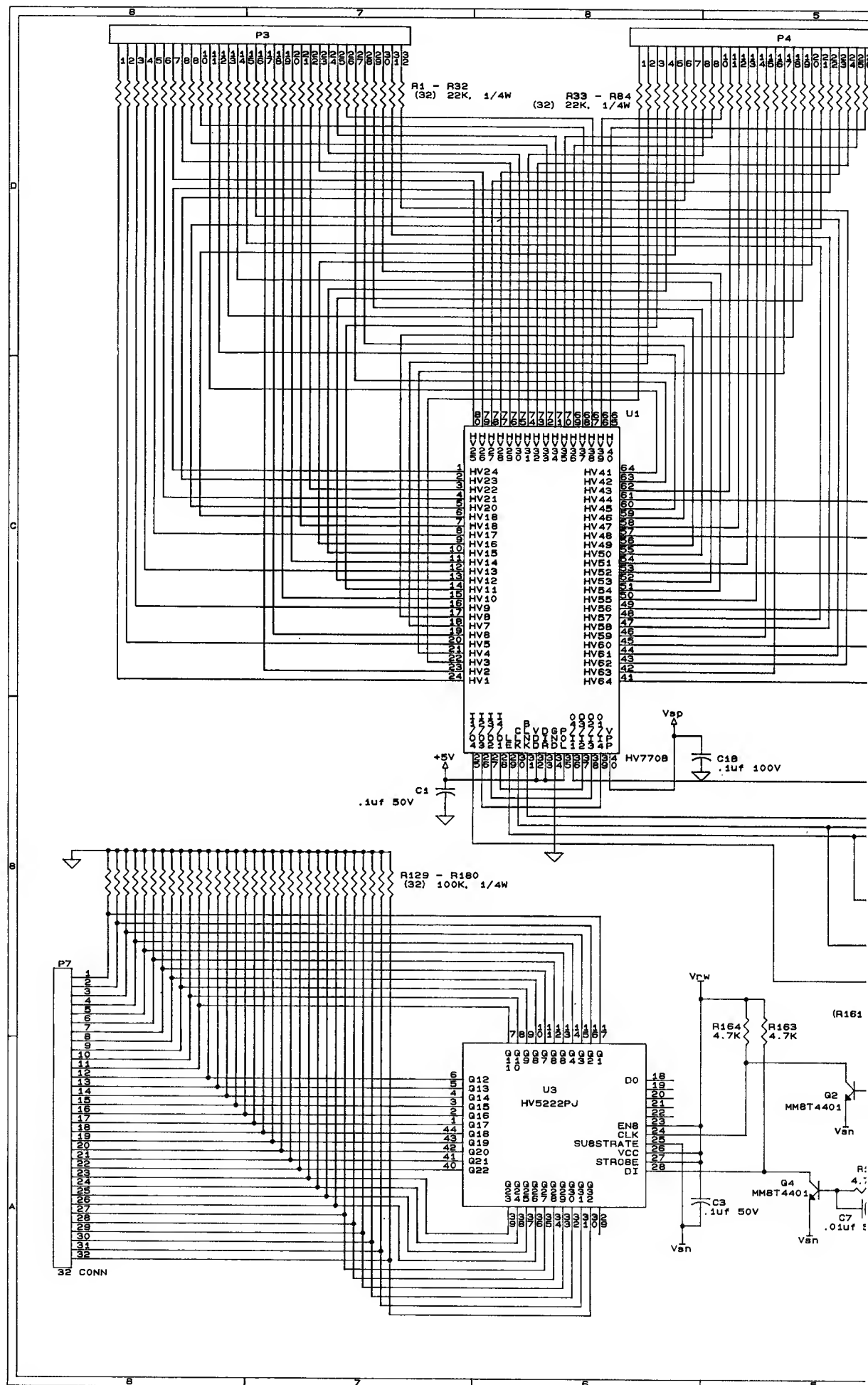
FOLD
B

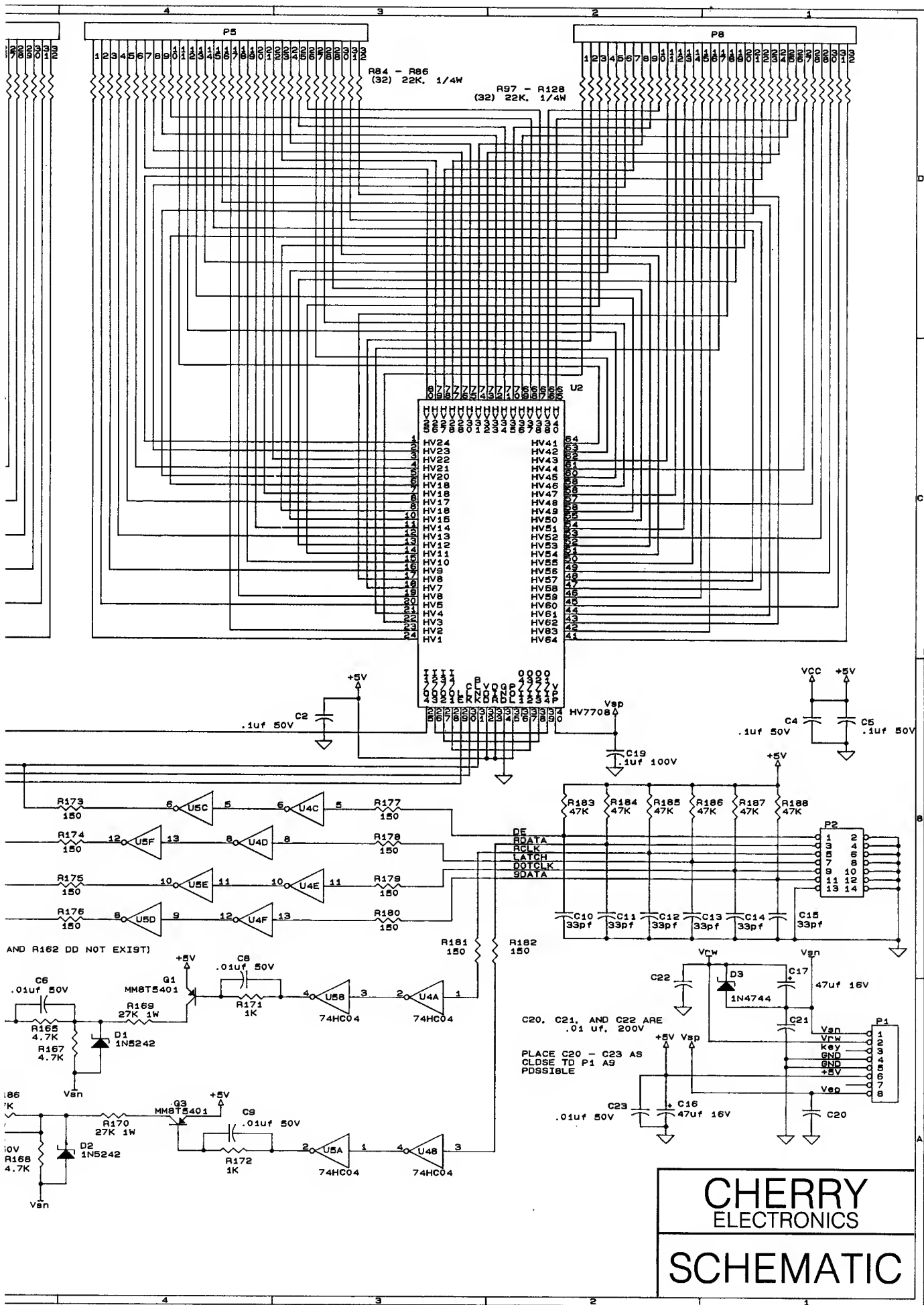
281103

CLASS 2

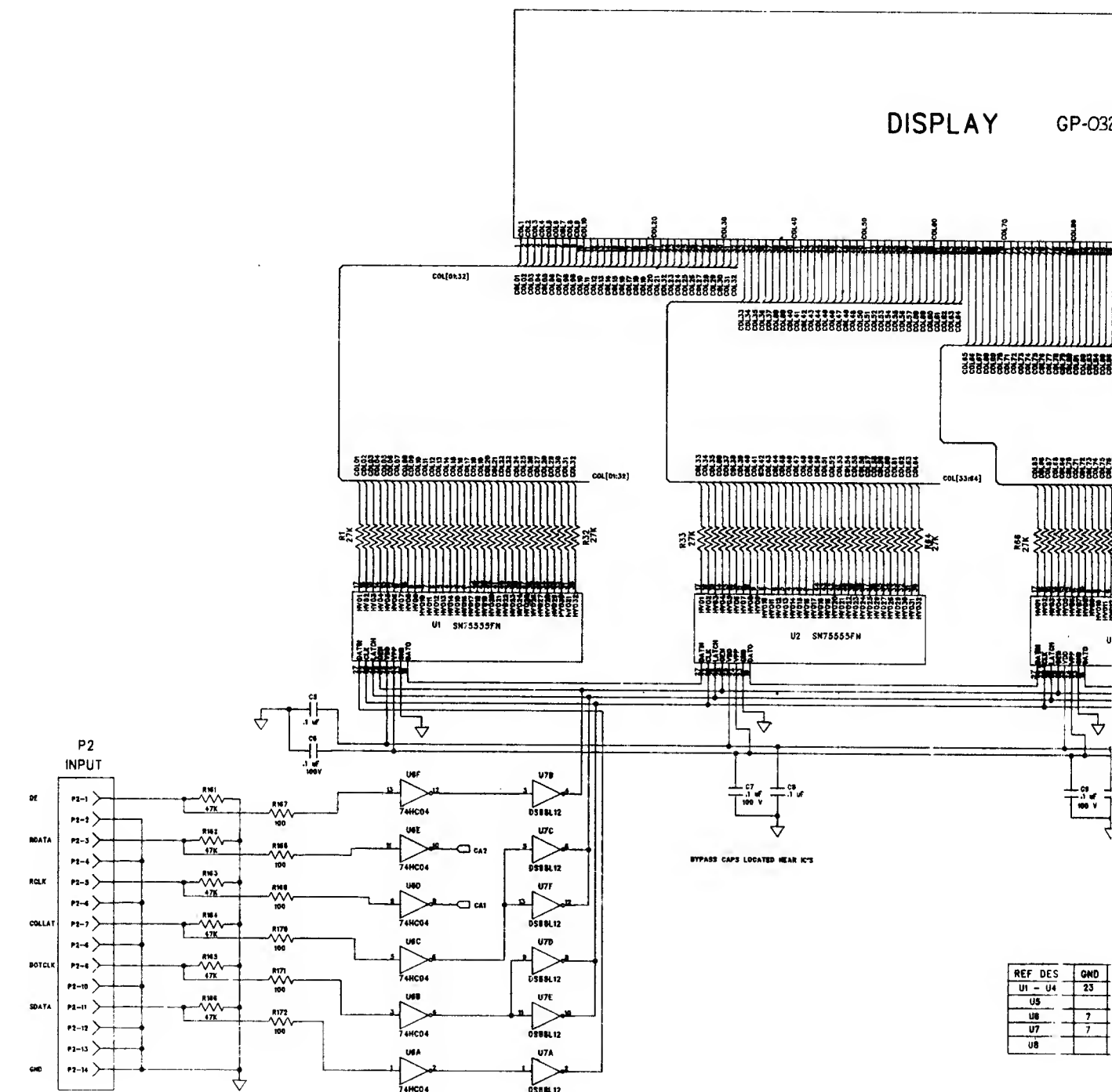
THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF DALE ELECTRONICS, INC. AND SHALL NOT BE REPRODUCED, COPIED, OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF APPARATUS WITHOUT PERMISSIVE WRITING. BREAK SHARP CORNERS AND ROUNDS DIMENSIONS APPLY OVER UNFINISHED SURFACES COMMERCIAL TOLERANCES APPLY TO STOCK SIZES GEOMETRIC SYMBOLS PER ANSI Y14.5 ALL MACHINED SURFACES <input checked="" type="checkbox"/> FINISH DIMENSIONS IN BRACKETS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES 21/64 .005 0.005 0.005	SIGNATURES DR <i>John Matijka</i> 92-02-21 CHKD <i>Vera Kucman</i> 92-03-08 DSGN <i>Z. SHANK</i> 92-02-06 APPD <i>KEITH ROYSE</i> 92-03-07	DATE 92-02-21 92-03-08 92-02-06 92-03-07	DALE ELECTRONICS, INC. A COMPANY OF VISHAY COLUMBUS, NEBRASKA
	MATERIAL			TITLE ELECTRICAL SCHEMATIC APD-128G032
	FINISH			SIZE CODE IDENT NO. DRAWING NO. D 91637 281103
				SCALE NONE SHEET 1 OF 1

A



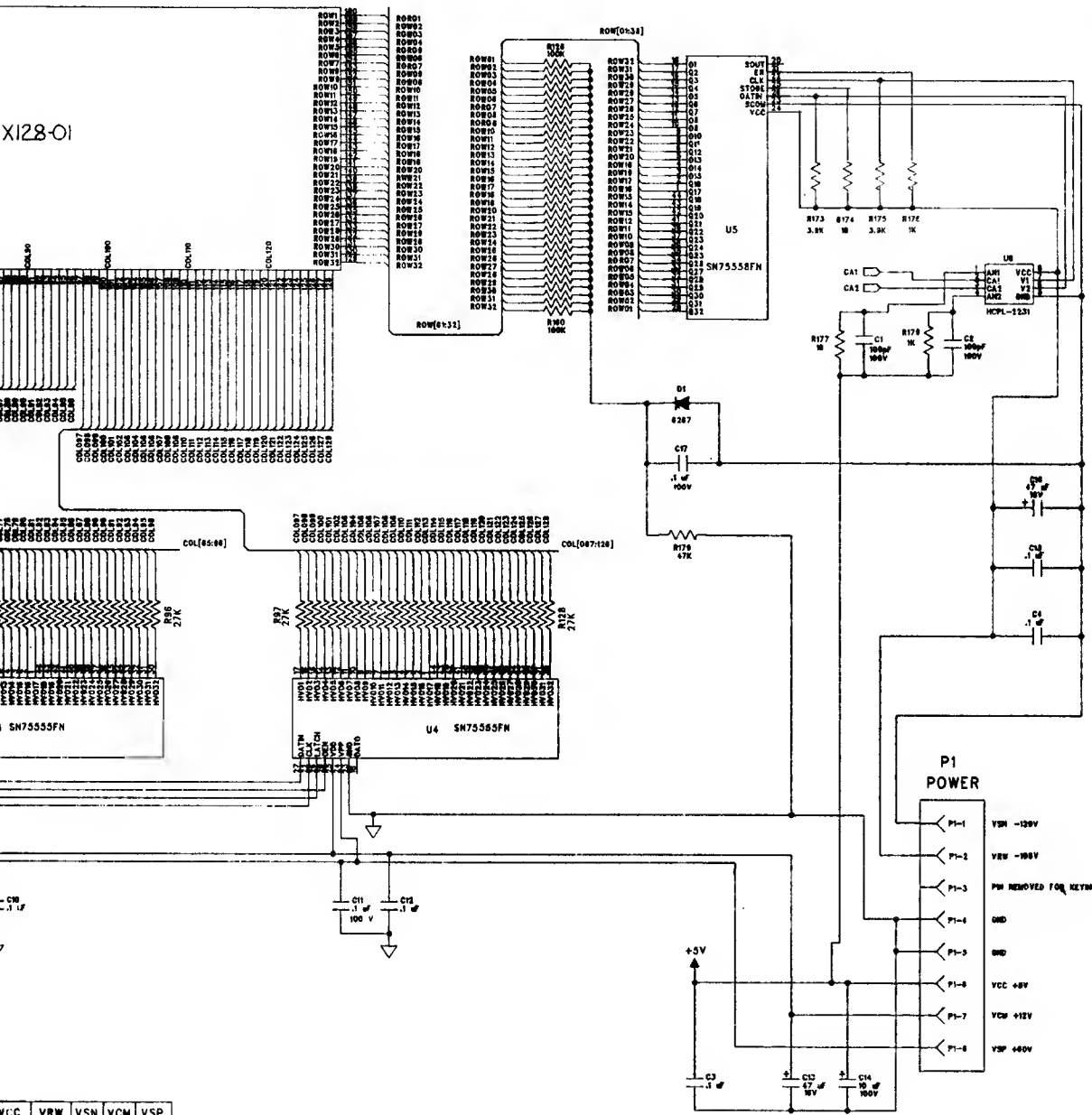


DISPLAY GP-032



2. RESISTOR VALUES ARE IN OHMS, 1/8 WATT, 5%.
 1. CAPACITOR VOLTAGES ARE 50V, 20%.
- NOTES: UNLESS OTHERWISE SPECIFIED.

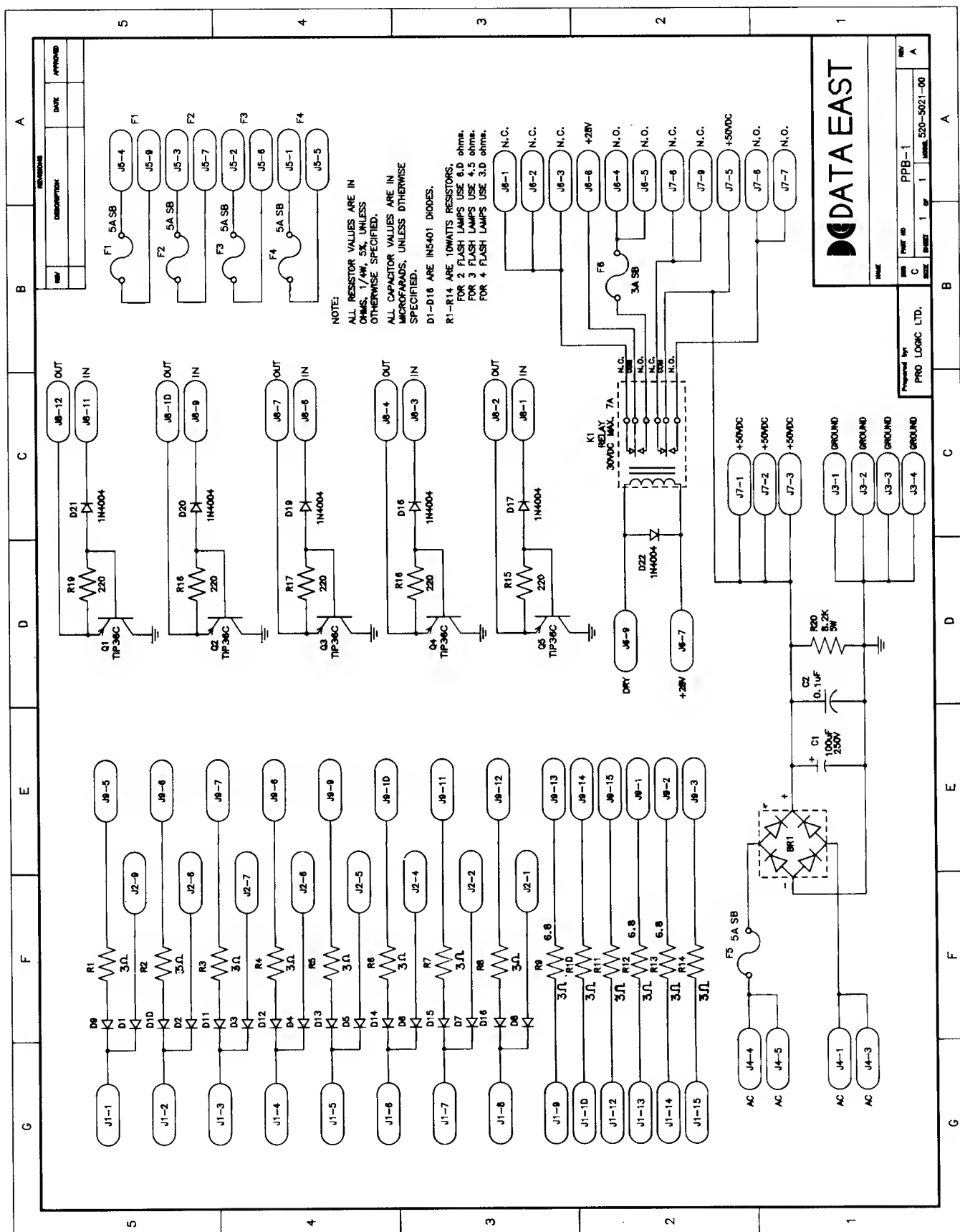
REF	DES	QND
U1 - U4		23
U5		
U6		7
U7		7
U8		

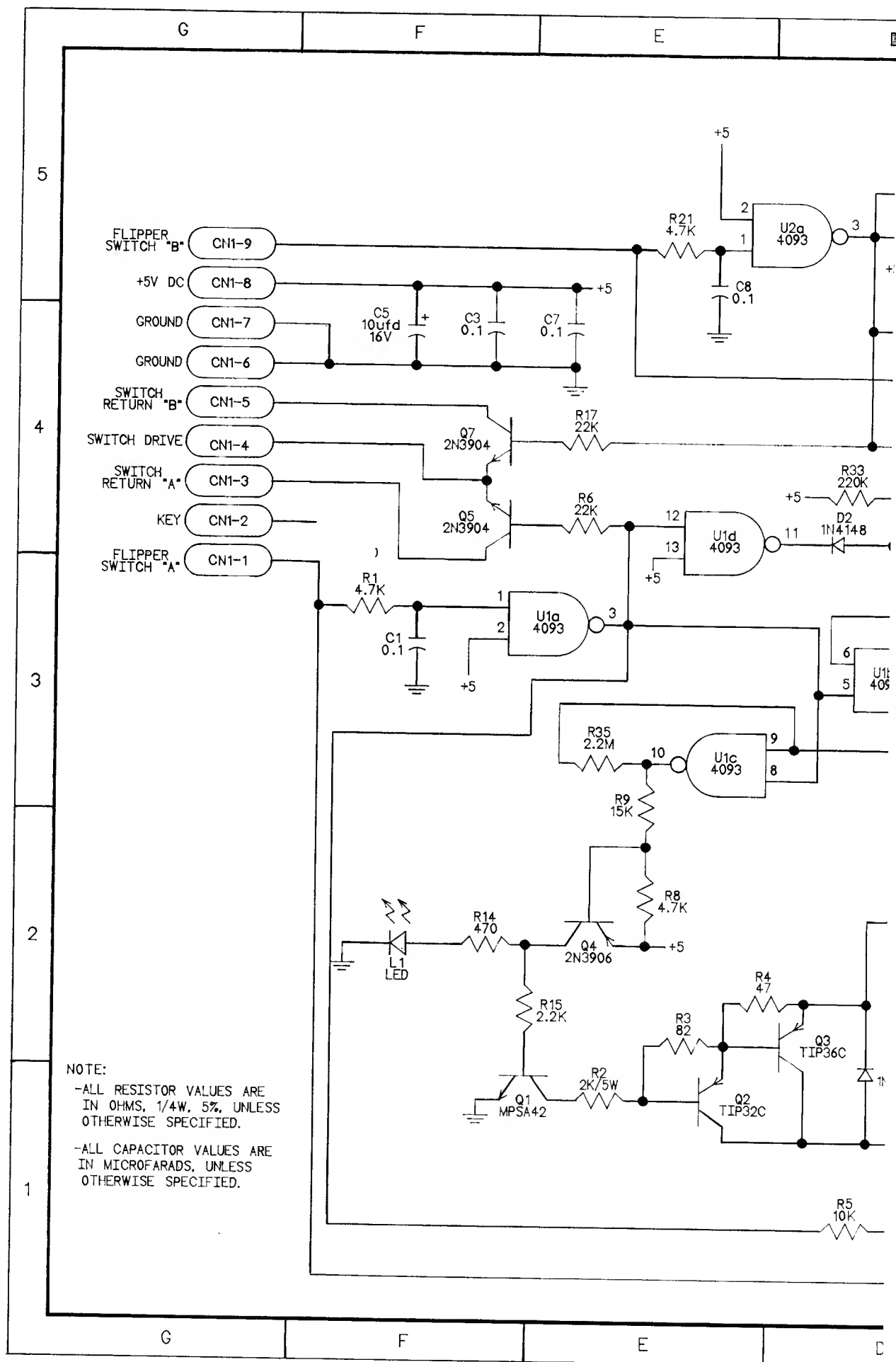


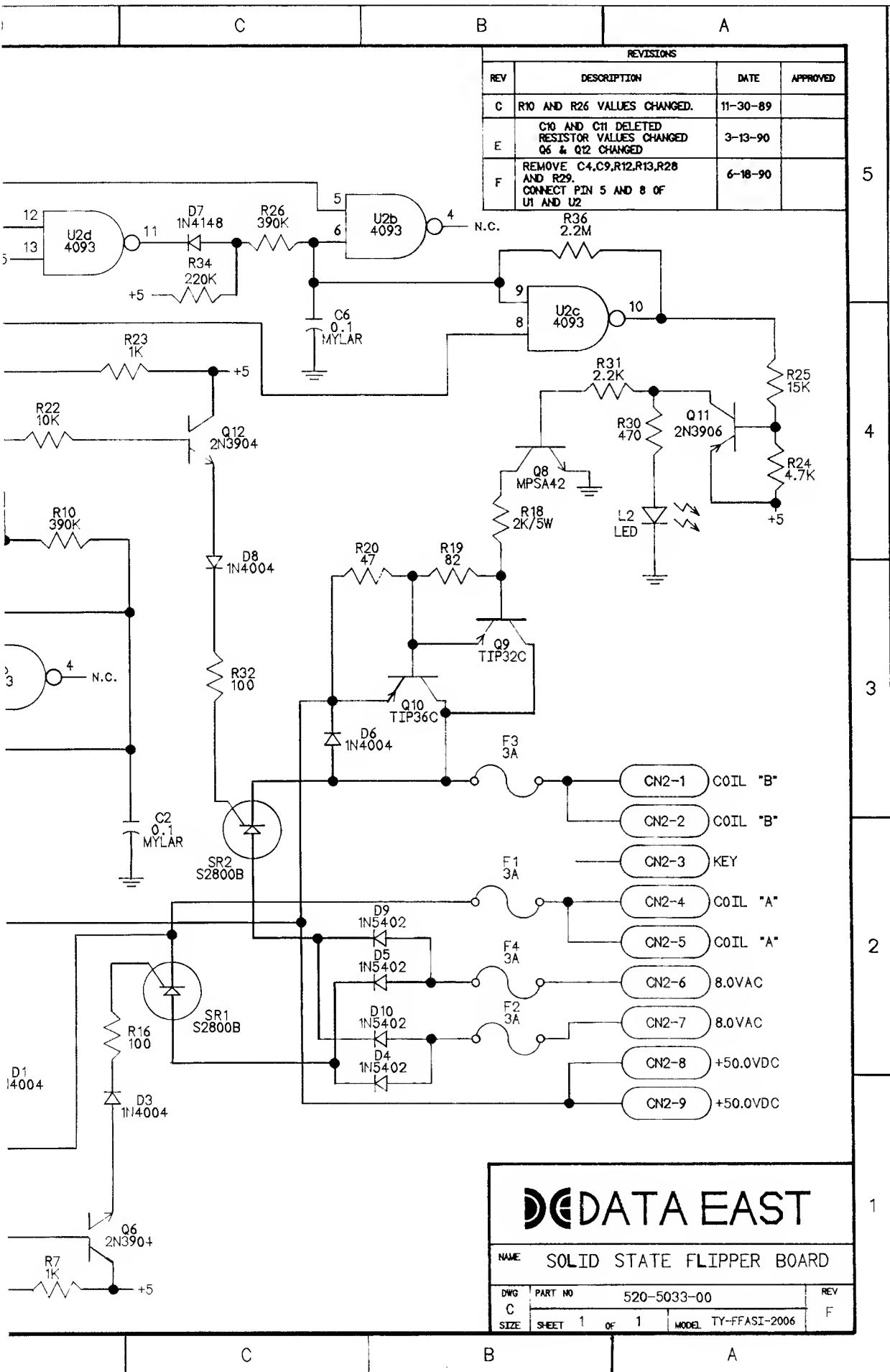
VCC	VRW	VSN	VCM	VSP
	24	23	25	24
16			14	
	8	5		

PADS LOGIC VER. 2.03 FILE: DM32128.SCH		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES: XXX ±.005 XX ±.020 ANGLES ±		CONTR NO.	
		DRAWN BY RAY DEESE		DATE 10-16-91	
		CHECK BY		DATE	
		APPR BY		DATE	
		DO NOT SCALE PRINT			
NEXT ASSY USED ON		THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF BABCOCK AND IS TO REMAIN SUBJECT TO THE CONDITIONS THAT THE INFORMATION (A) IS BEING IN CONFIDENCE, (B) NOT BE REPRODUCED OR COPIED IN WHOLE OR IN PART AND (C) NOT BE USED OR INCORPORATED IN ANY PRODUCT, EXCEPT UNDER AN EXPRESS WRITTEN AGREEMENT WITH BABCOCK.		BABCOCK DISPLAY PRODUCTS, INC. 1091 S. EAST STREET ANAHEIM, CALIFORNIA 92805	
APPLICATION		CODE IDENT. 66646		1510-0106	
		SCALE		SIZE D SHEET 1 OF 1	









DATA EAST

NAME SOLID STATE FLIPPER BOARD

DWG C	PART NO 520-5033-00	REV F
SIZE	SHEET 1 OF 1	MODEL TY-FFASI-2006

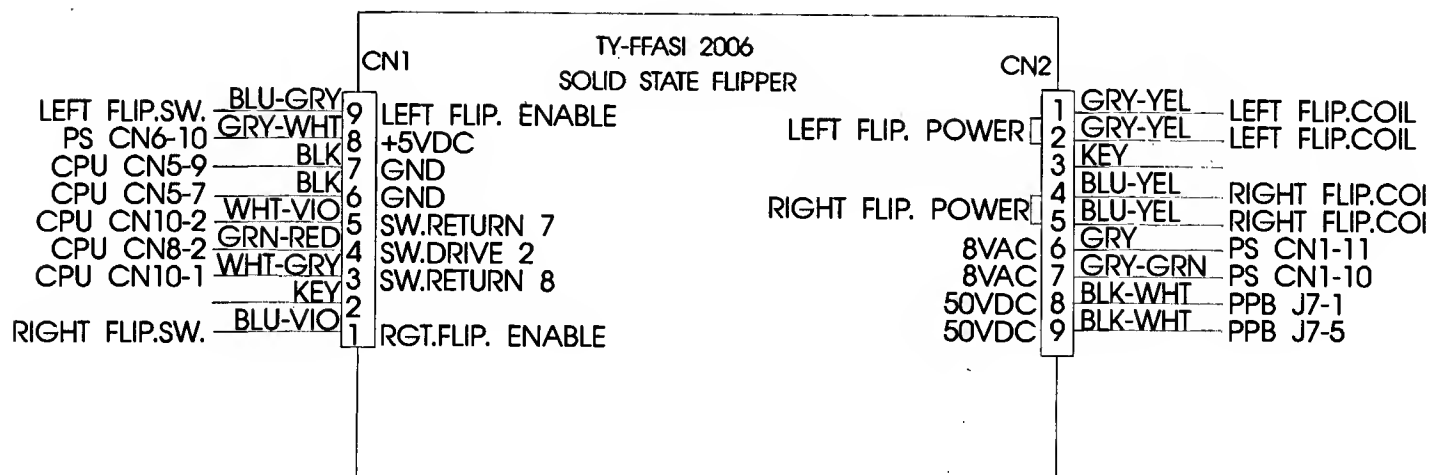


Theory of Operation for the Solid State Flippers

- The solid state flipper board is a dual flipper solenoid driver circuit. Each solenoid driver circuit contains a one shot timer, a 50V driver, and an 8V driver.

Looking at one circuit, Schmidt NAND gates U1A, U1B, and U1D make up the one shot timer. The timer length is controlled by R10, R33 and C2. The output of the timer is gated at U1C with the buffered switch input from Q6. The output of U1C controls the 50V driver circuit consisting of Q4, Q1, Q2, Q3, and D1. As long as the flipper button is activated, Q6 will keep the 8V driver circuit, SR1, on.

The 50V provides the actuation power to the flipper solenoid while the 8V provides the holding power.



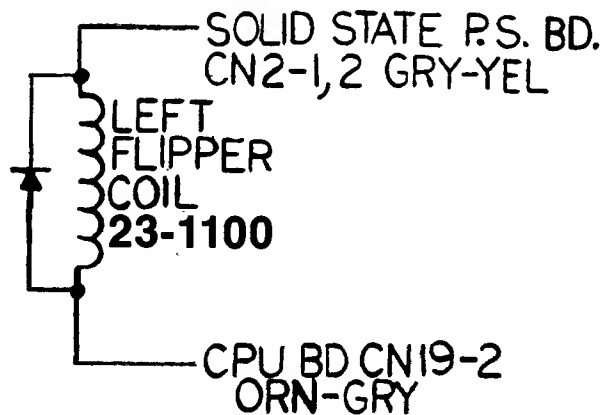
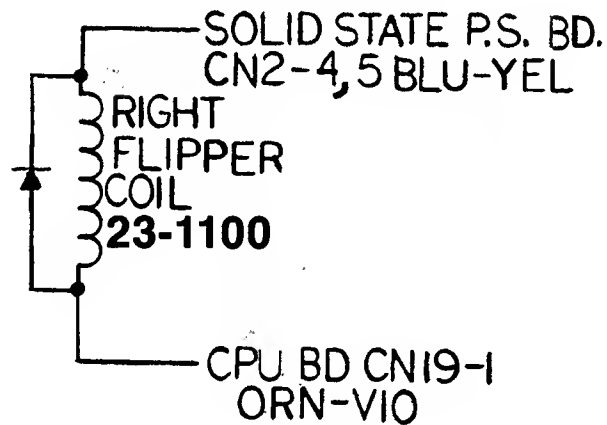
Solid State Flippers
PCB Wiring Diagram

Connector CN 1

Pin #	Goes To	Wire Color	It Is
1	Rgt. Flipper Sw.	BLU-VIO	RGT. FLIP ENABLE
2			KEY
3	CPU CN10-1	WHT-GRY	SW. RET 8
4	CPU CN8-2	GRN-RED	SW. DRV 2
5	CPU CN10-2	WHT-VIO	SW. RET 7
6	CPU CN5-7	BLK	GND
7	CPU CN5-9	BLK	GND
8	PS CN6-10	GRY-WHT	+5VDC
9	Lft. Flipper Sw.	BLU-GRY	LFT. FLIP ENABLE

Connector CN 2

Pin #	Goes To	Wire Color	It Is
1	Lft. Flip Coil	GRY-YEL	LFT. FLIP POWER
2	****	*****	****
3			KEY
4	Rgt. Flip Coil	BLU-YEL	RGT. FLIP POWER
5	****	*****	****
6	PS CN1-11	GRY	9 VAC
7	PS CN1-10	GRY-GRN	9 VAC
8	PPB J7-1	BLK-WHT	50 VDC
9	PPB J7-5	BLK-WHT	50 VDC



232-5200-00
6-32 X 1/4 PH PAN (2)

6-32 X 3/8 PH

535-6485-00
MTG. BRKT.

545-5315-00
O-RING DRIVE

535-5172-00
DRIVE BRKT.

535-6481-00
MTG. PLATE

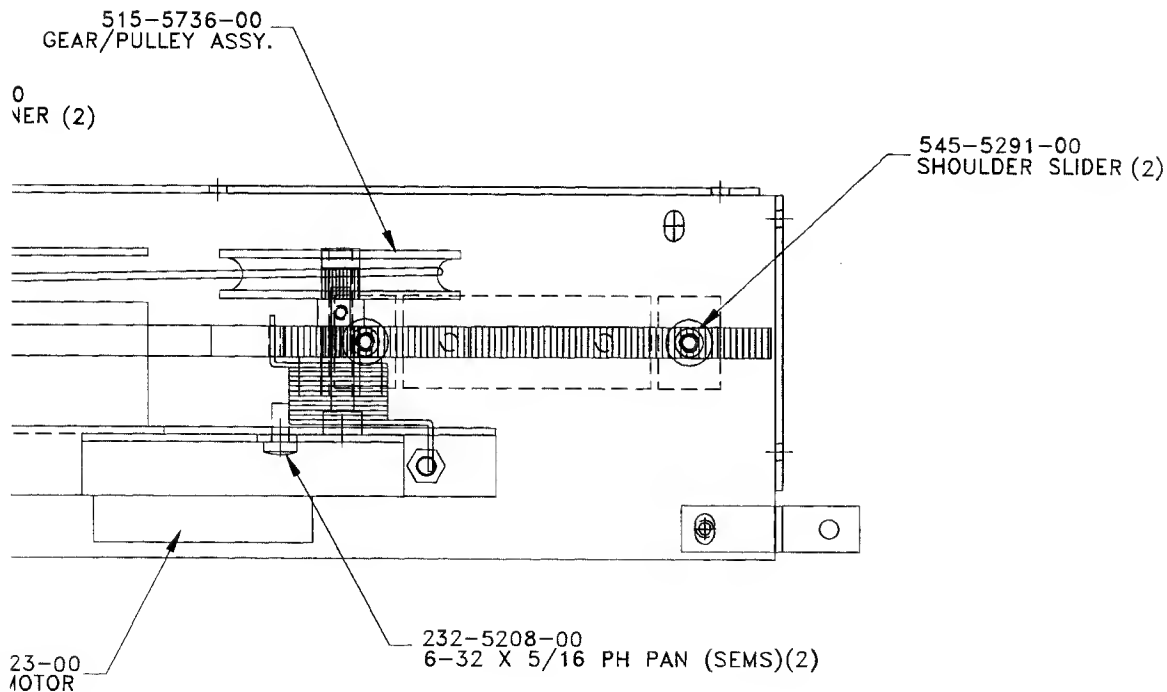
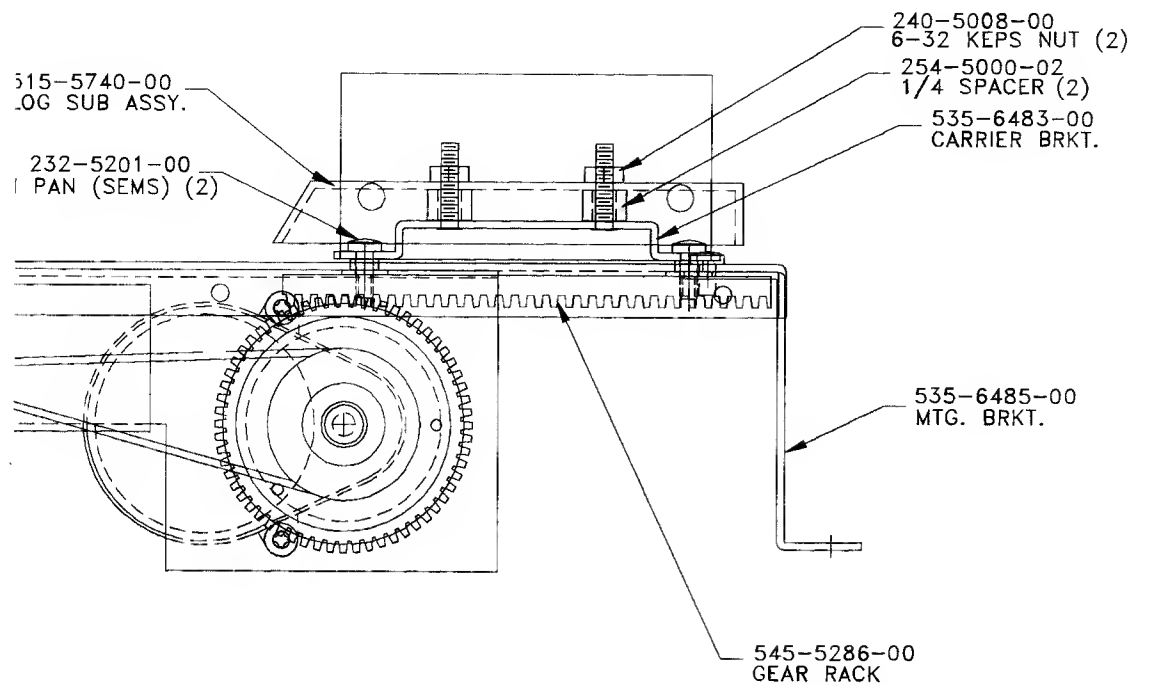
515-5737-00
SAW/SHAFT ASSY.

545-5237-00
1/4 ID NYLI

240-5008-00
6-32 KEPS NUT (2)

041-50
DRIVE M

REV.	DESCRIPTION	BY	DATE	APP.
------	-------------	----	------	------



TOLERANCE UNLESS
OTHERWISE NOTED

DIMENSION
XX ± .015
XXX ± .010
XXXX ± .005

FRACTIONAL ± 1/64
ANGULAR ± 1/2°

REQ.	NEXT ASSY.	DWN. BALCER	DATE 1-14-93	TITLE
MAT.		CHK'D	SCALE FULL	NELL LOG ASSY.
H.T.				
FIN.				
DATA EAST PINBALL, INC. 1990 JANICE AVE, MELROSE PARK, IL. 60160				PART NO. 500-5638-00

234-5101-05(5)
#8 X 1/2 HWH

515-5716-00
BRK'T. LAMP ASS'Y.

830-5447-00
ARM

535-6450-01
GUIDE

545-5381-01(3)
DEEP CHANNEL

234-5001-02(6)
#6 X 1/2 HWH

234-5000-00(2)
#6 X 3/8 HWH
234-5001-02 (2)
#6 X 1/2 HWH

254-5000-
HEX SPACE
& 232-5201-
6-32 X 3/4

830-5438-
ROCKY
545-5381-
DEEP CHA

830-5
RHIND
830-
LION

270-5001-00(3)
RETAINING RING

626-5001-00
FOAM
232-5200-00(6)
6-32 X 1/4

090-5037-03(3)
COIL 23 1/2-765

270
RE1
515
PLU

545
RUB

535-6500-00(3)
COIL & STOP BRK'T. DETAIL A-A

R 1 1/8 LG.
8 PHMS

-500-5603-00
INSERT ASS'Y. LIGHTS,
SOCKETS & CABLE

34-5000-00 (4)
6 X 3/8 HWH
36-5295-00
ABLE

-830-5447-27
BUTYRATE CURTAIN

820-6083-00
ARL STICKER

12 (SEE DETAIL B-B)

~~-0213~~
NNEL

438-03

5438-01

515-5568-03
LEVER #3

515-5568-02
LEVER #2

515-5568-01
LEVER #1

-515-5567-00
PLATE & STUD

-515-5717-00
BRK'T. ASS'Y.

-234-5000-00(2)
#6 X 3/8

270-5002-00 (3)
RETAINING RING

-5002-00(3)

TRAINING RING

-5696-00(3)
NCFB 1 1 1964

NGER & LINK

530-5226-00 -
BUSHING

036-5272-00
-CABLE ASS'Y.

- 240-5002-00
6-32 T-NUT

-240-5008-00
6-32 KEPS NUT

237-5513-00
-5105-00(3) 6-32 X 2"
BER BUMPER

ARM<REF.>

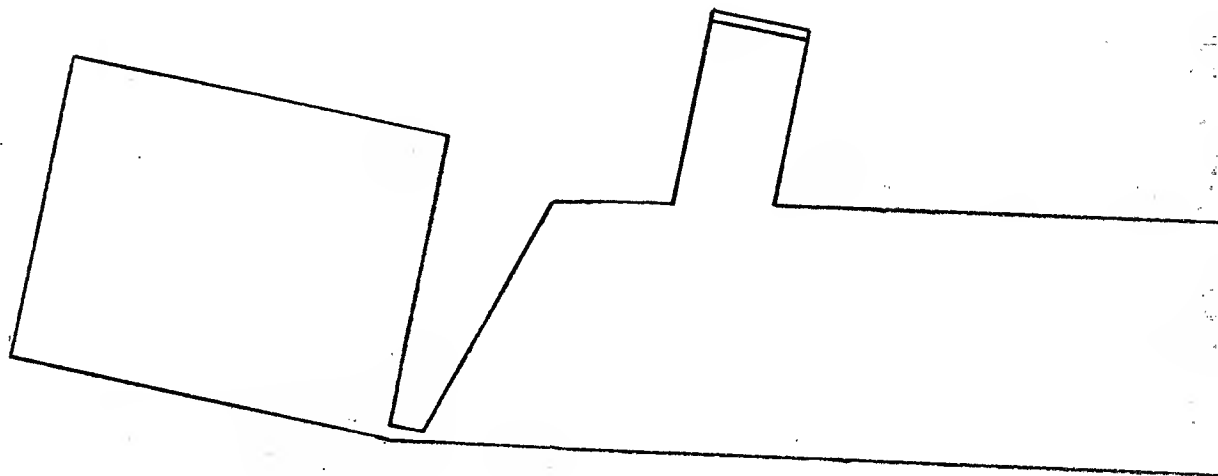
INSERT<REF.>

DETAIL B-B

BULB	PART NO#.
555 BULB	165-5002-00
906 BULB	165-5004-00

WATERLOO
1815

HAT TRICK DATA EAST PUBLISH, INC. 300 JEFFERSON AVE. S.W. ATLANTA, GA 30334		FORM NO. 300-0462-01
---	--	-------------------------



244-5001-C
B2 LOCK WASI

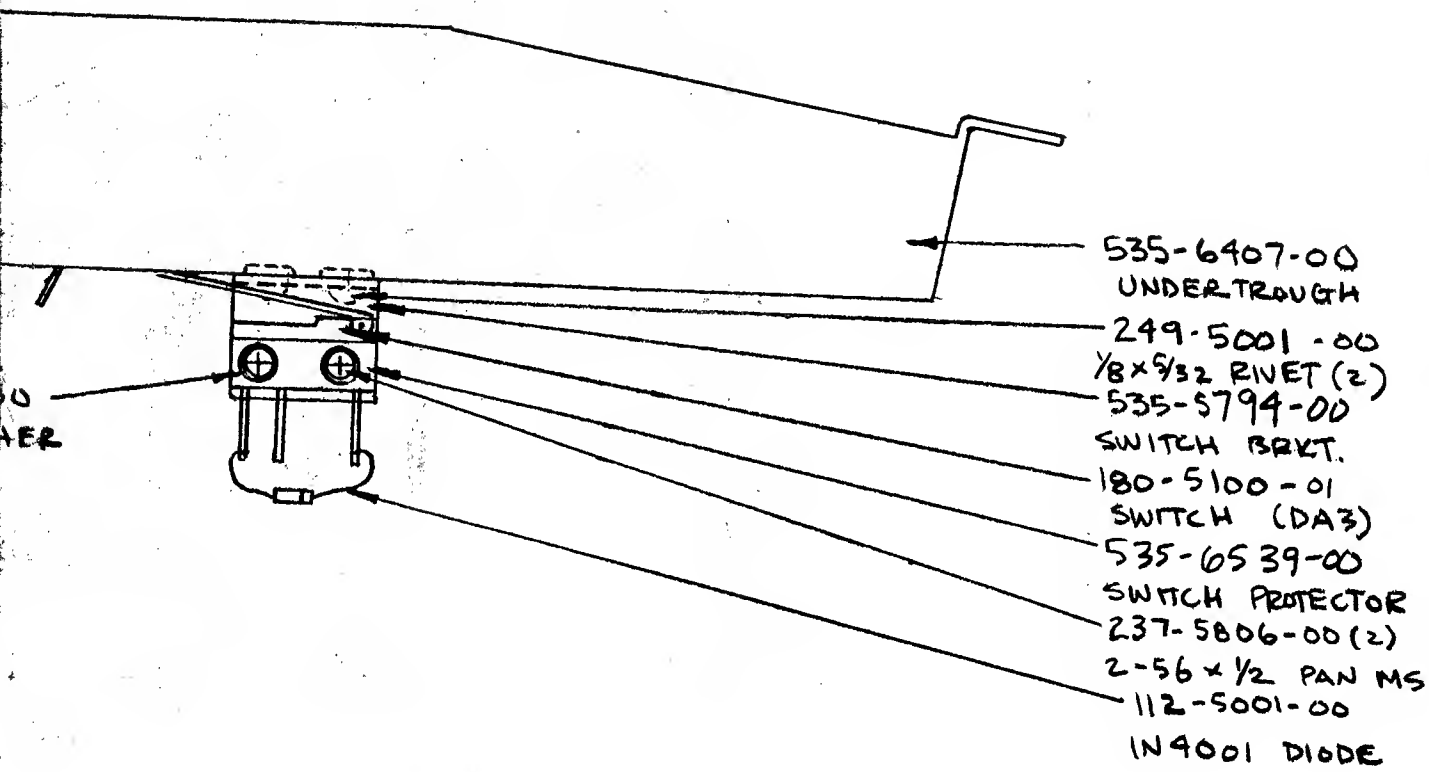
TOLERANCE UNLESS
OTHERWISE SPECIFIED


DIM. X.X ± .05	X.XXX ± .005
X.XX ± .015	X.XXXX ±

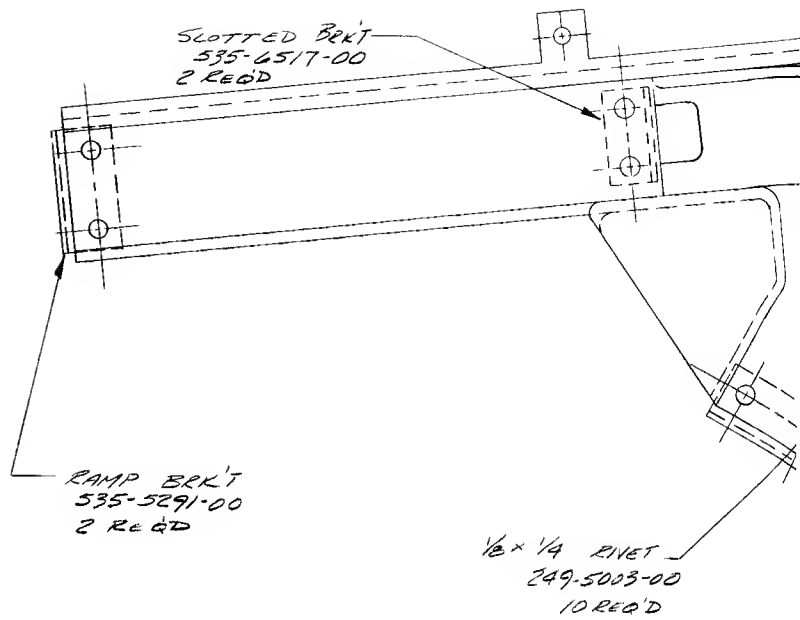
ANGULAR
XX ± .5°
XX.X ± .1°

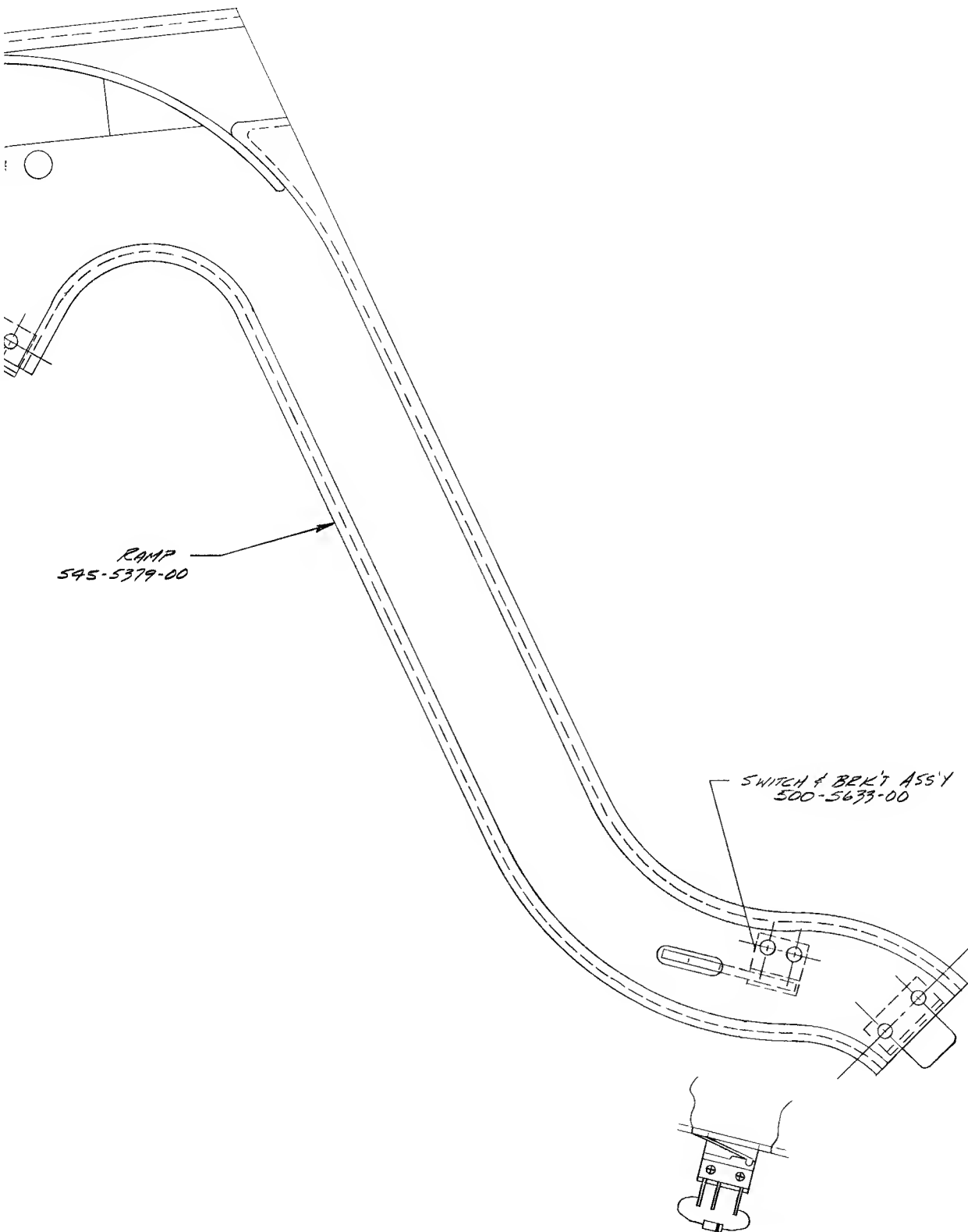
FRACTIONAL ± 1/64

	REV	DESCRIPTION	BY	DATE	APP
--	-----	-------------	----	------	-----



REQ.	1	NEXT ASSEM.	DWN.	TWS	DATE	12.30.92	TITLE	UNDER TROUGH ASSY.
MAT.			CH'KD.		SCALE			
H.T.							 DATA EAST PINBALL, INC. 1990 JANICE AVE., MELROSE PARK, IL. 60160	PART NO.
FIN.								500-5630-00-





TOLERANCE UNLESS
OTHERWISE SPECIFIED

DIM. XX ± .05 X.XXX ± .005
X.XX ± .015 X.XXXX ±

ANGULAR
XX ± 5°
XX.X ± 1°

FRACTIONAL ± 1/64

REQ.	NEXT ASSEM.	DWN. <i>MKN42</i>	DATE <i>1-2-99</i>	TITLE <i>PLASTIC RAMP ASSEMBLY</i>
MAT.		CHKD.	SCALE <i>1/2"</i>	
PLT.				
FINL.				
DE DATA EAST PINBALL, INC. 1990 JANICE AVE., MELROSE PARK, IL. 60160				PART NO. 500-5634-00

249-5011-00
1/8 X 5/16 RIVET (2)

500-
SWITC

535-6518-00
SLOTTED BRKT.

535-6018-00
ASSY. SHIM

820-5086-00
DECAL

535-6358-00
RAMP FLAP

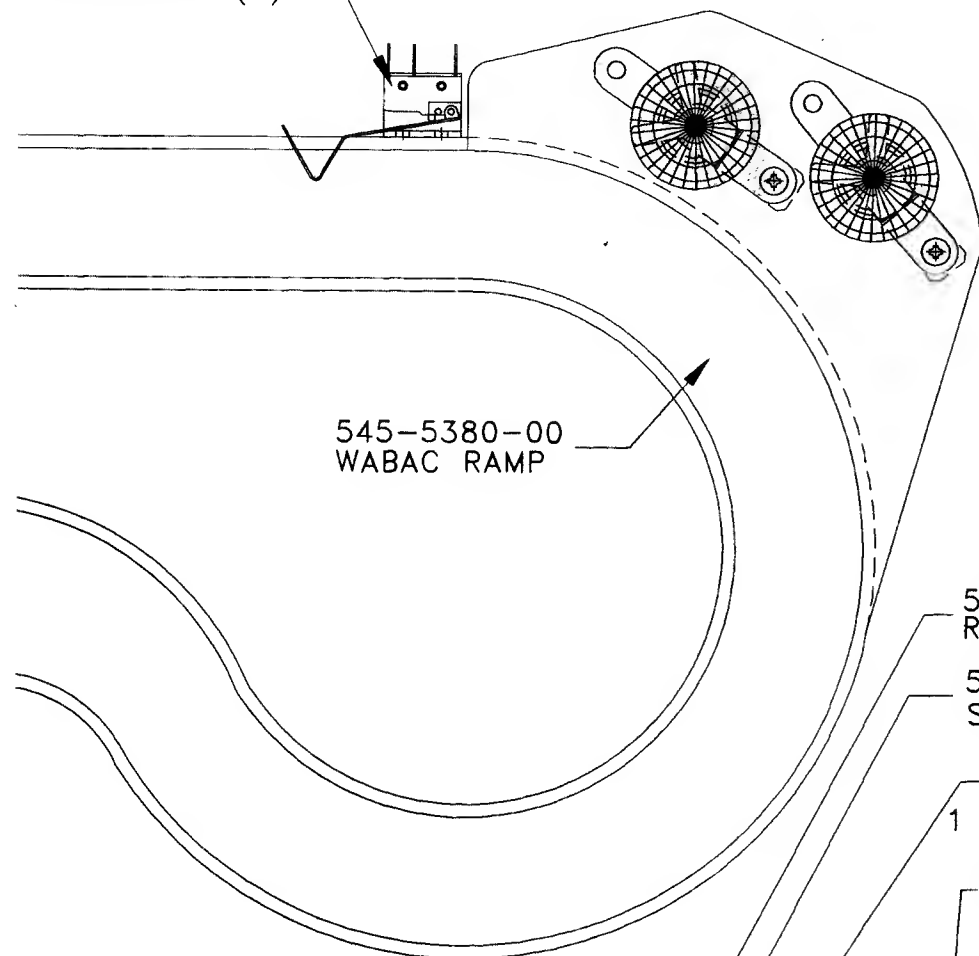
249-5007-00
1/8 X 7/32 RIVET (2)

1/8

TOLERANCE UNLESS
OTHERWISE NOTED

DIMENSION	FRACTIONAL ± 1/16
X.X ± .015	ANGULAR ± 1/2°
X.XX ± .010	
X.XXX ± .005	

-5633-00-22
H SUB ASSY.(1)



545-5380-00
WABAC RAMP

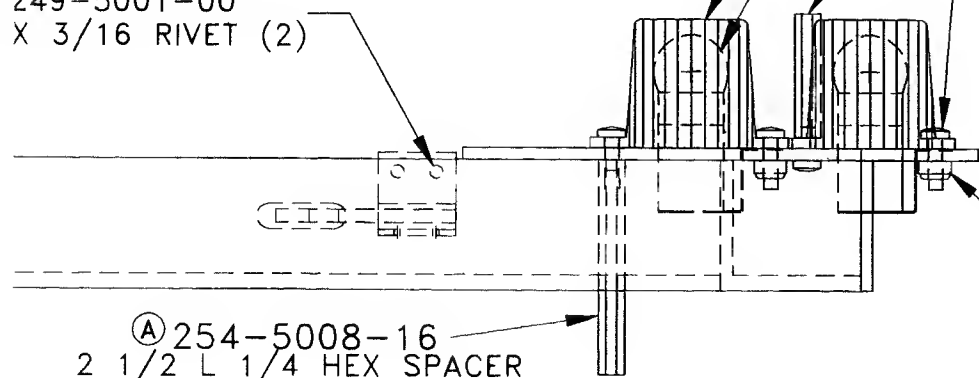
550-5031-02
RED MINI-MARS (2)

518-5101-01-22
SOCKET & BULB ASSY.(2)

254-5008-09 (A)
1 1/2 L 1/4 HEX SPACER

232-5202-00
6-32 X 1/2 PH PAN (4)

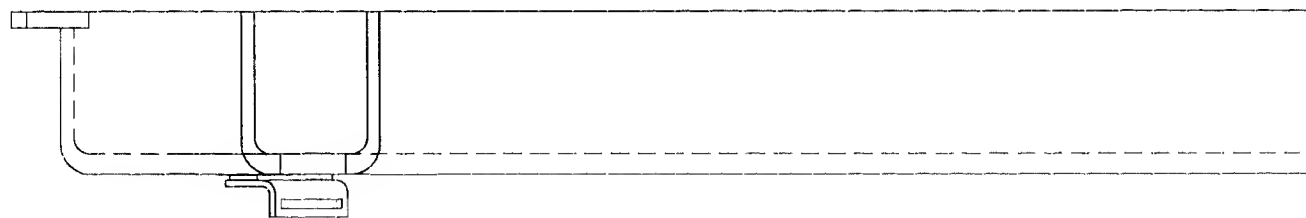
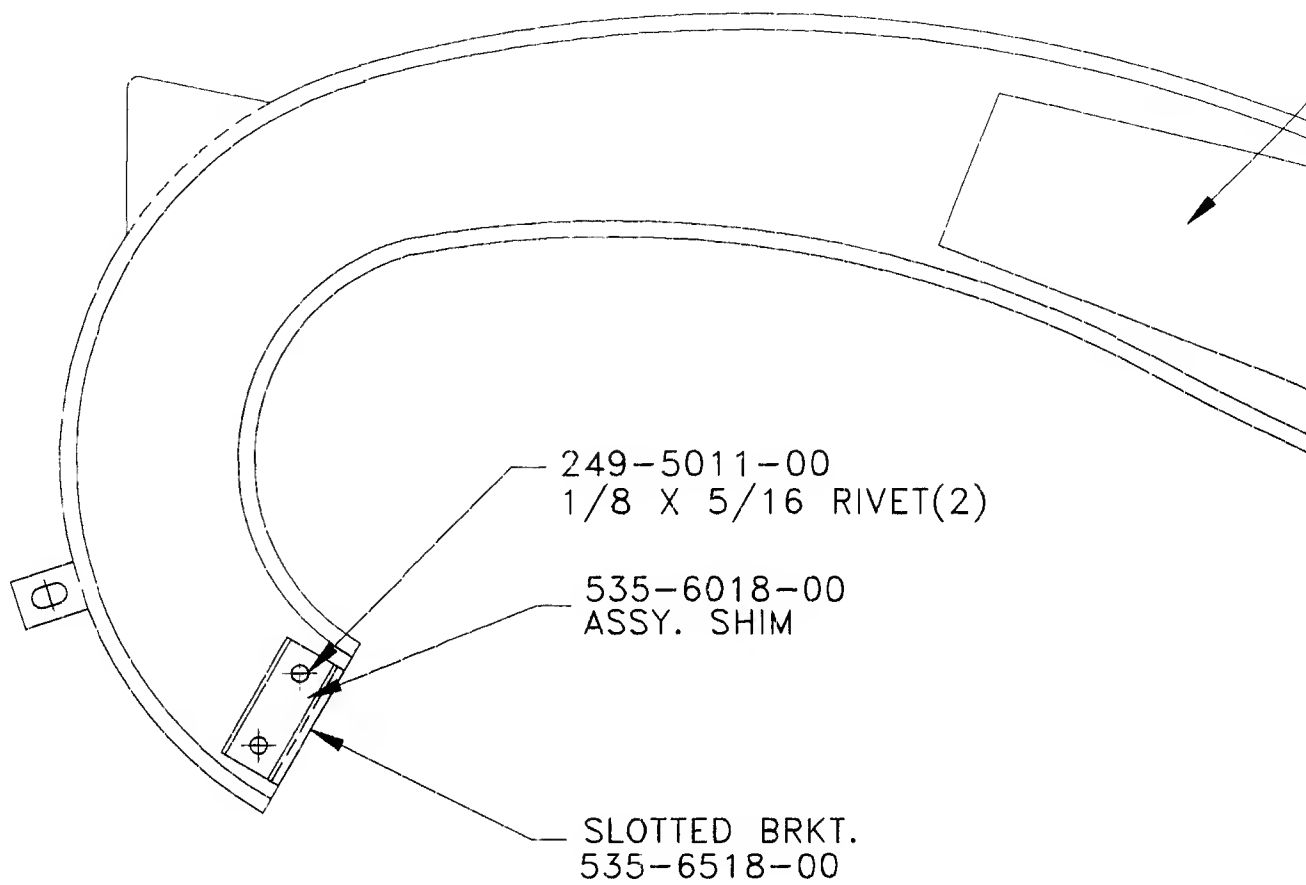
249-5001-00
X 3/16 RIVET (2)



240-5005-00
6-32 NYLOC (2) (A)

(A) 254-5008-16
2 1/2 L 1/4 HEX SPACER

REQ.	NEXT ASSY.	DWN. BALCER	DATE 12-23-92	TITLE
MAT.		CH'KD	SCALE NONE	WABAC RAMP ASSY.
H.T.		DATA EAST PINBALL, INC.		PART NO.
FIN.		1990 JANICE AVE., MELROSE PARK, IL. 60160		500-5632-00



TOLERANCE UN
OTHERWISE NO

DIMENSION	FRACTION	ANGULAR
XX ± .015		
X.XX ± .010		
X.XXX ± .005		

RAMP DECAL
820-5068-02

535-6428-00
ENTRANCE PLATE

545-5379-01
PLASTIC RAMP ENTRANCE

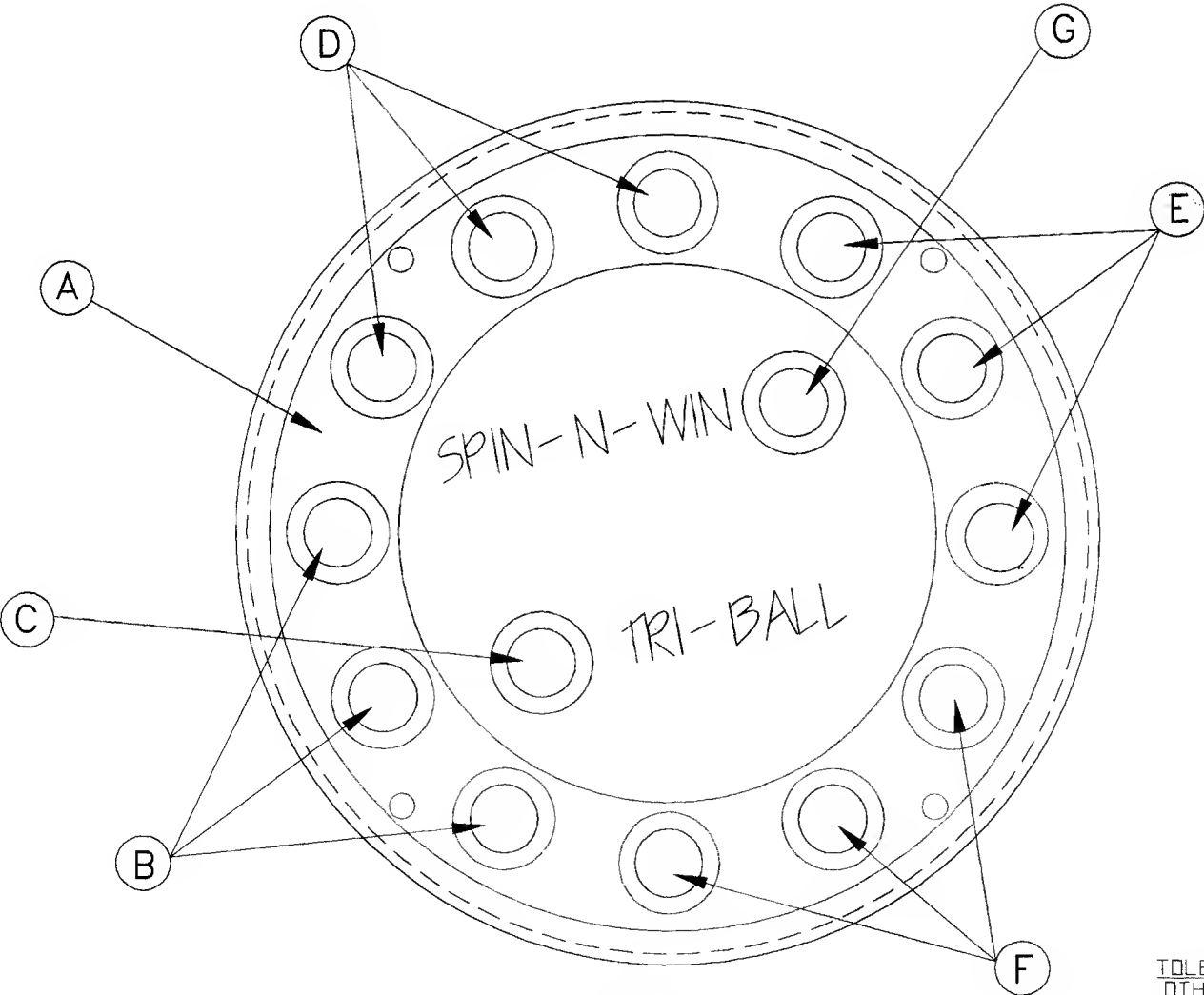
249-5007-00
1/8 X 7/32 RIVET (2)

ESS
TED

NAL ± 1/64
± 1/2°

REQ.	NEXT ASSY.	DWN. BALCER	DATE 12-14-92	TITLE
MAT.		CH'KD	SCALE NONE	RAMP ENTRANCE ASSY.
H.T.		DATA EAST PINBALL, INC.		PART NO.
FIN.		1990 JANICE AVE., MELROSE PARK, IL. 60160		500-5637-00

ITEM	PART #	DESCRIPTION	QTY.
A	820-5083-01	DECAL	1
B	545-5014-02	LIGHT COVER (RED)	3
C	545-5014-03	LIGHT COVER (AMBER)	1
D	545-5014-04	LIGHT COVER (GREEN)	3
E	545-5014-05	LIGHT COVER (BLUE)	3
F	545-5014-06	LIGHT COVER (YELLOW)	3
G	545-5014-07	LIGHT COVER (ORANGE)	1
H	545-5282-06	PANEL SPACER	4
J	545-5364-00	CLOCK FACE	1
K	237-5504-00	6-32 X 3/4 PH PAN	2
L	254-5000-01	1/2 SPACER	2
M	535-6476-00	CLOCK SUPPORT BRKT	1
N	520-5061-01	LIGHT BOARD	1
P	036-5267-00	CABLE ASSY.	1

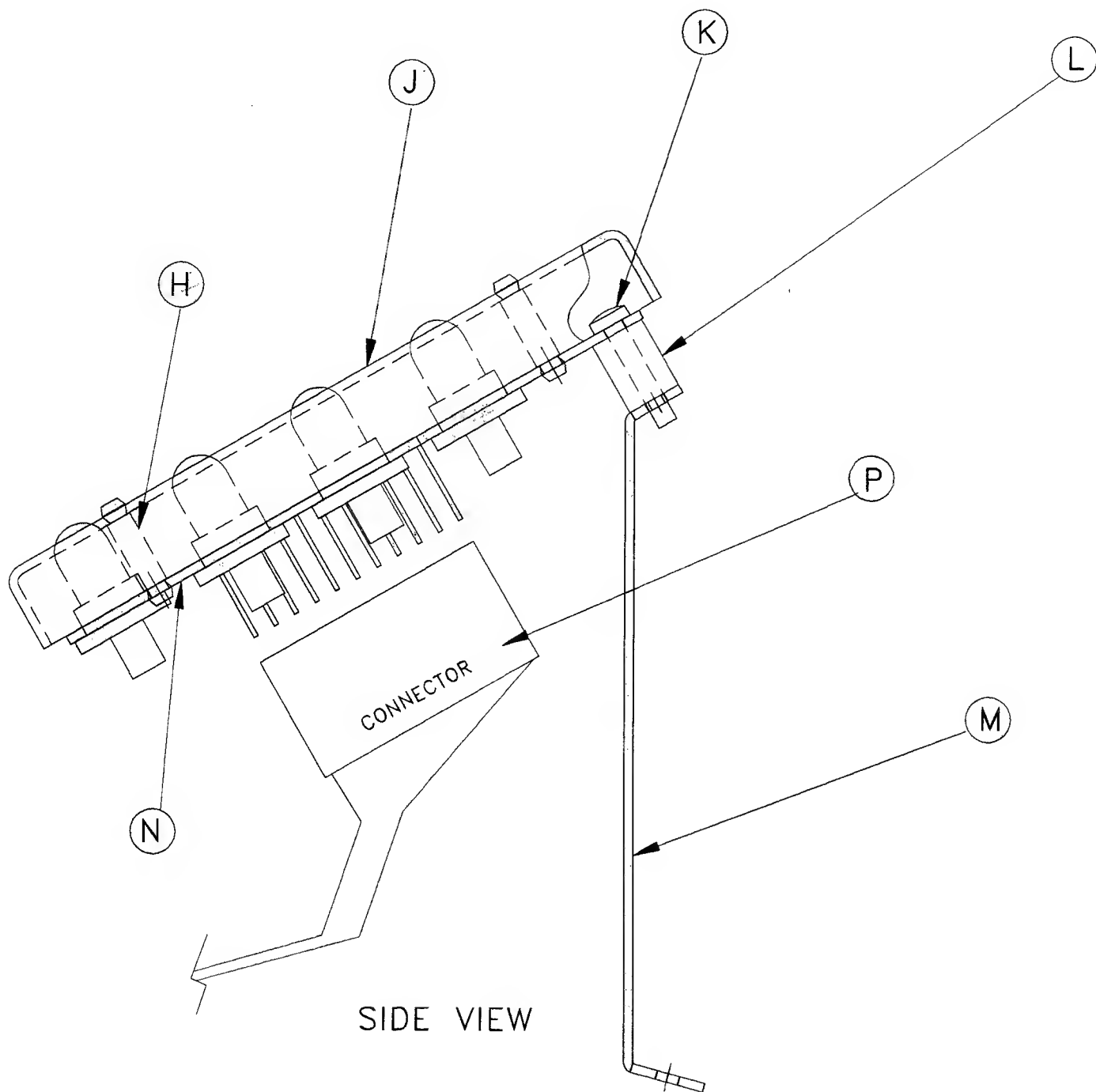


TOP FRONT VIEW

TOLERANCE UNLESS
OTHERWISE NOTED

DIMENSION FRACTIONAL ± 1/16
X.X ± .015 ANGULAR ± 1/2°
X.XX ± .010
X.XXX ± .005

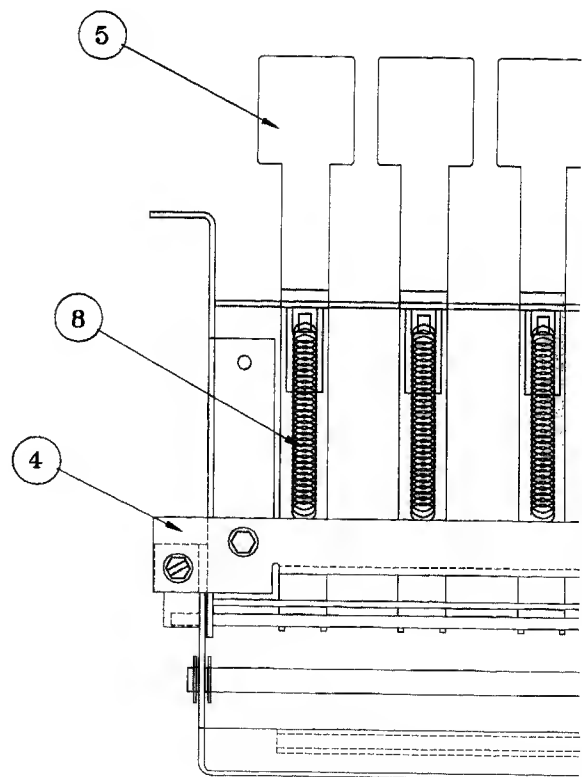
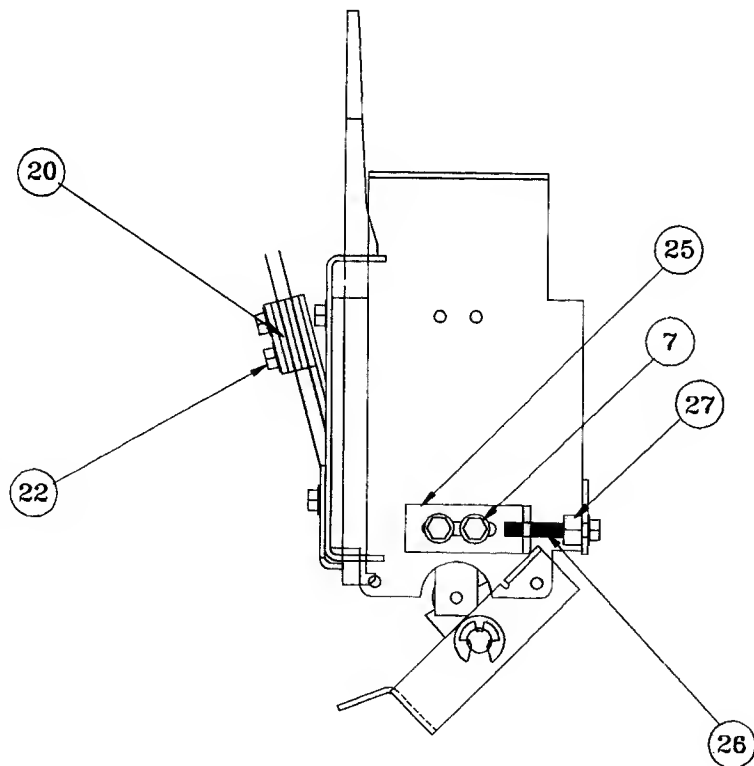
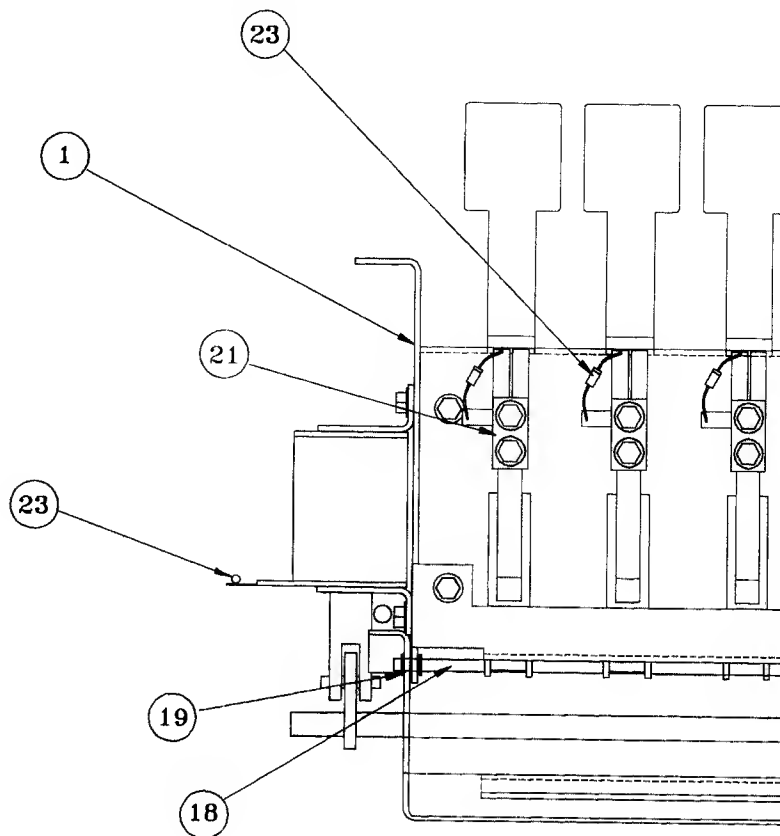
REV.	DESCRIPTION	BY	DATE	APP.
------	-------------	----	------	------

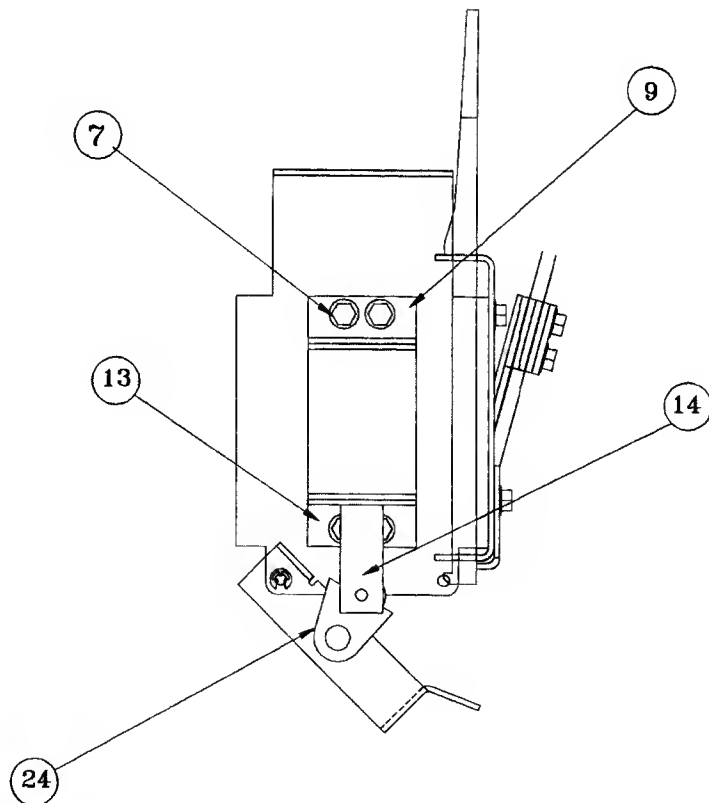
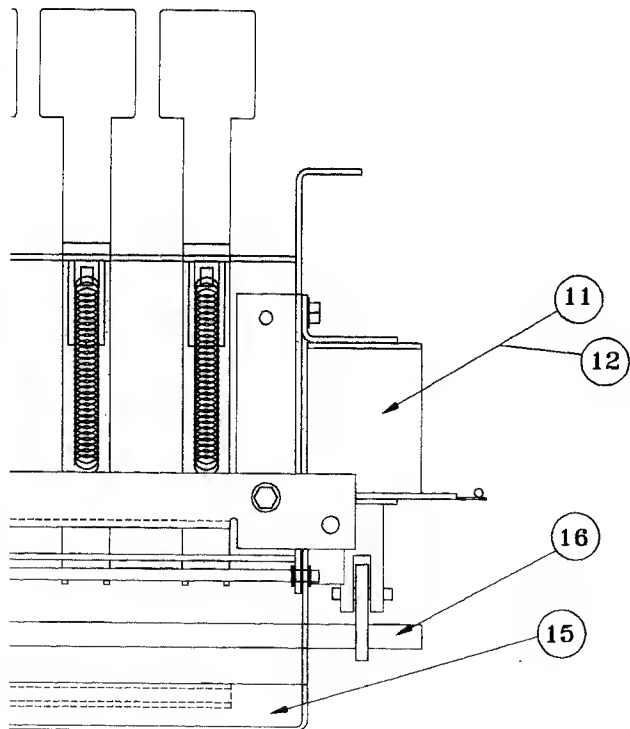
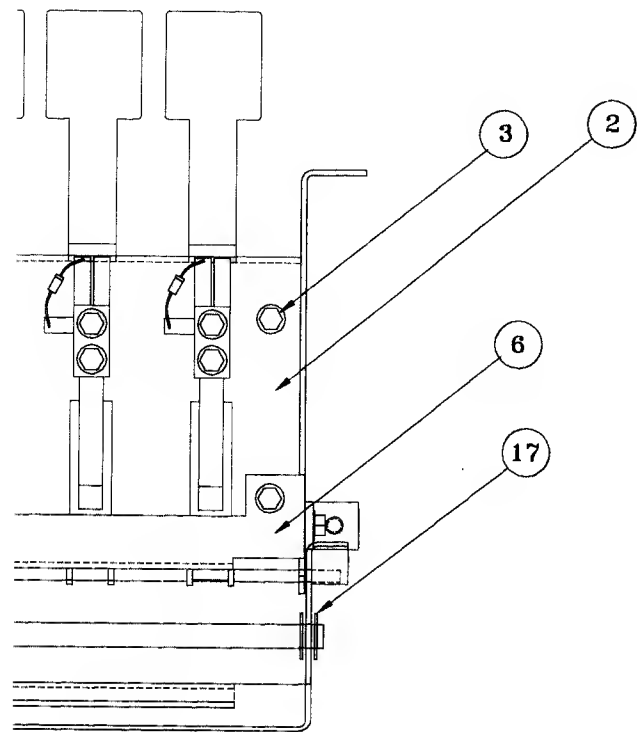


REQ. 1 PER	NEXT ASSY.	DWN. BALCER	DATE 11-20-92	TITLE
MAT.		CH'KD	SCALE 1=1	CLOCK ASSEMBLY
H.T.		DATA EAST PINBALL, INC.		PART NO.
FIN.		1990 JANICE AVE., MELROSE PARK, IL. 60160		500-5627-00

#	DESCRIPTION	PART #
1	TRGT. END PLATE (2)	535-6182-00
2	TRGT. FRAME	535-6159-03
3	8-32 X 3/8 (6)	237-5879-00
4	SPRING MTG. PLATE	535-6510-05
5	TARGET	545-5048-01
6	TRGT. RETAIN BRKT.	535-5042-03
7	6-32 X 3/8 SCREWS TYPE 28 (8)	237-5891-00
	TRGT. RESET SPRING	265-5003-00
	COIL SUPPORT BRKT.	535-6154-00
10		
11	23-700 COIL	090-5022-00
12	COIL SLEEVE	545-5031-00
13	PLUNGER STOP BRKT.	515-5068-00
14	PLUNGER/LINK ASSY.	515-5336-00
15	TRGT. LIFT BRKT.	535-6509-05
16	TRGT. SHAFT	530-5179-03
17	E-RING (1/4)	270-5002-00
18	PIVOT SHAFT	530-5160-03
19	E-RING (1/8)	270-5000-00
20	SWITCH ASSY.	180-5092-01
21	SWITCH PLATE	535-5045-00
22	6-32 X 1/2	237-5878-00
23	IN 4004 DIODE	112-5003-00
24	PLUNGER LINK	545-5062-00
25	ADJ. BRKT.	535-6508-00
26	8-32 X 7/8 (1)	237-5890-00
27	8-32 NYLOC	240-5102-00

•QUANTITY IS DESIGNATED BY BANK SIZE





TOLERANCE UNLESS
OTHERWISE NOTED

DIMENSION FRACTIONAL $\pm 1/64$
XX $\pm .015$ ANGULAR $\pm 1/2^\circ$
XXX $\pm .010$
XXXX $\pm .005$

PARTEC # PB-1126

REQ.	NEXT ASSY.	DWN. BALZER	DATE 12-02-92	TITLE
MAT.		CHK'D	SCALE 1=1	5-BANK DROP TRGT. ASSY. (ADJUSTABLE)
H.T.				
FIN.				
			DATA EAST PINBALL, INC. 1990 JANICE AVE., MELROSE PARK, IL 60160	PART NO. 500-5621-05